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UNIV. OF

CHURCH OF SAN DIEGO,
AGUAS CALIENTES, MEXICO.

The field of the dome is composed of alternating rows of buff and white tile, the ribs and top of lantern of blue and white.

Christ's Hospital School.

BY HENRY A. FROST.

PLANS BY WALTER G. THOMAS.

CHRIST'S HOSPITAL SCHOOL, or as it is more familiarly known to Englishmen, the "Bluecoat School," was founded by Edward VI. in 1553, in London, on the site of the Grey Friars, as a mathematical school for boys and girls. Under royal patronage the school grew so rapidly that eventually it was divided, the boys' division remaining in London, while the girls were transferred to Hertfordshire. But in spite of this division the London school was for many years handicapped in its cramped quarters. Not until 1894 however did the authorities take a decisive step to improve the situation. Then a committee was appointed to study conditions and to advise as to the establishment of a new school. This committee reported that while for ease of control, convenience and economy of administration, the medieval quadrangle plan admits of no improvement, still for conditions of healthy life it has some defects. It is unsanitary because an inclosed quadrangle with its four corners excludes some sunlight and causes a stagnation of air. An abundance of sun and a free movement of air being considered a prime requisite of health for the boys the committee advised the adoption of a plan which would separate the buildings.

They further recognized that such a principle pushed to extremes would result in an unworkable plan and so advised a combination of the two principles, the dormitories to be well separated and given a southern exposure, and the working portion to be disposed around a cloistered quadrangle in order to permit a greater facility in management.

GREAT HALL.

The requirements of the competition as then drawn up called for fourteen houses each to accommodate fifty boys in dormitories of not more than twenty-five nor less than ten beds. Each house was to provide ample day rooms, baths, lavatories, sitting rooms and bedrooms for a house master and an assistant master, a sitting room and a bedroom for a matron and studies and cubicles for two monitors. The suggestion was also made that the houses would best be arranged in blocks of two or three for greater ease of discipline.

A head-master's house and at least six other masters' houses were required.

There was to be a dining hall centrally located having a seating capacity of eight hundred and twenty with adequate kitchens and accommodations for the kitchen staff, and closely connected with it, a master's common room.

Sufficient housing was required also for a smaller preparatory grade, the treatment of which could be more or less independent of the rest of the group. Finally the residential requirements of the competition included very complete hospital accommodations with wards for at least one hundred boys, dispensary, operating room, a separate kitchen, and isolated fever wards.

The educational group, according to the program, required a "Speech Hall" of sufficient size to seat the whole school with space for an organ and an orchestra at one end and thirty class rooms varying in size grouped as far as possible — except the science class rooms — around or contiguous to it. There was also required a science school with chemical and physical laboratories, a library and museum which might be contained in one building, sufficient drawing rooms, and a chapel.

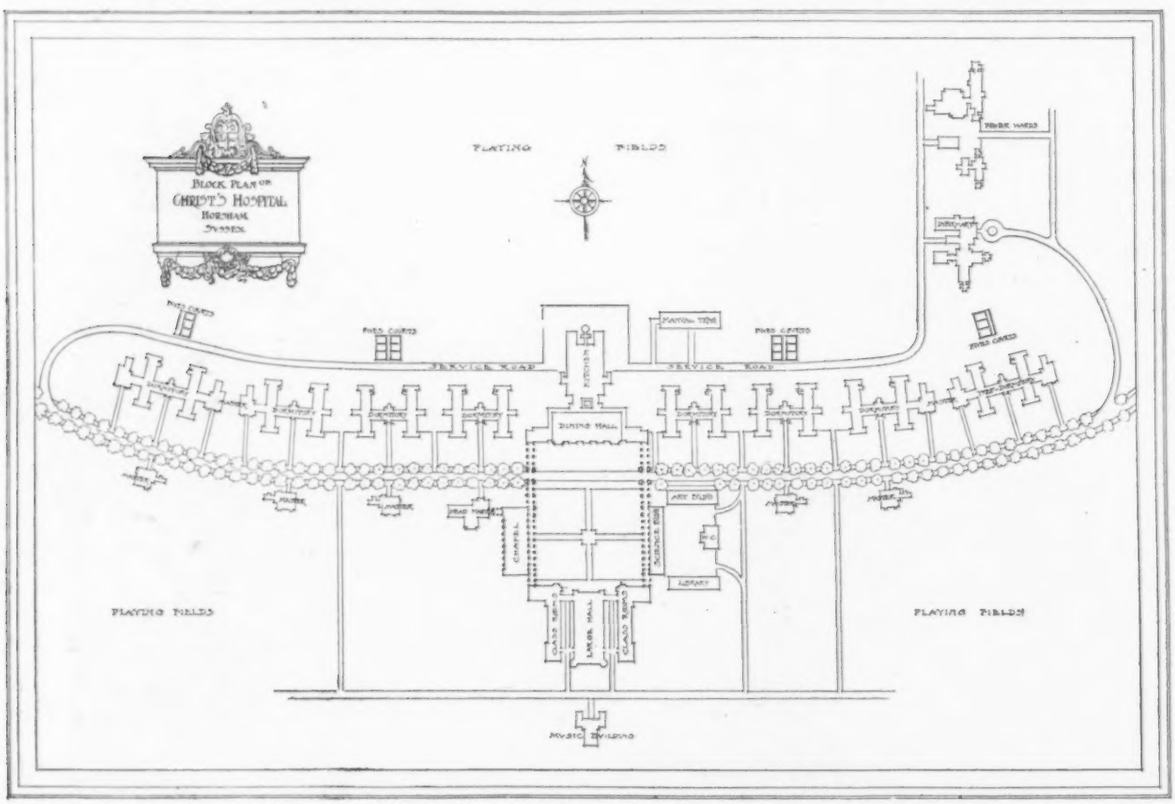
After due deliberation the competition was awarded to Messrs. Webb and Bell whose plans, it was decided fulfilled the requirements more skilfully than did those of any other architects competing. It was not however until 1897 that the corner stone of the dining hall was laid by the Prince of Wales (afterwards Edward VII) representing Queen Victoria. The day chosen for the ceremony was October 23d, the anniversary of the birth of the school's founder, Edward VI. For five years the work proceeded rapidly so that in 1902 the school stood ready to receive some seven hundred boys ranging in age from six to seventeen years.

The new school is admirably situated near Horsham, in Sussex, on a broad natural plateau somewhat above the level of the surrounding country where it receives the full benefit of sun and air. Two stone posts carved with shields and surmounted by lamps brought here from the old London school mark the entrance to the grounds. A driveway curves up a slight incline towards the school. To the left is an octagonal keeper's lodge of brick and plaster, perhaps the least successful building of the group. To the right of the drive, and well separated from the other buildings, are the fever sanitorium, and the infirmary which is in reality a fully equipped hospital with three large wards having accommodations for one

hundred boys. These rooms are lighted by windows on the two long sides. At the end of each room but separated from it by a short passage so that they form an annex are lavatories and baths. This treatment which occurs again in the dormitories is an interesting feature of the plan. There are numerous smaller rooms for more advanced cases, but as a rule if a boy is in a serious condition, though still able to be moved, he is tended outside the school. The purpose of the infirmary is rather to care for those ills and bruises so common in a boys' school. The surgical room therefore while equipped for any emergency seldom witnesses anything more serious than the dressing of a cut, the bandaging of a bumped head, or the treatment of a strained muscle.

dormitories and on through the school grounds until it reaches the public highway again. A glance at the plan will show that half of the living quarters of the school lies on each side of the quadrangle with the dining hall as the dividing point. The two dormitories at the end of the line, and furthest removed from the quad, are given over to the preparatory department.

The dormitories are built on an "H" plan. The governing portion containing the rooms of the resident master, his assistants, the matron and her assistants, lies in the connecting link. The central entrance used only by the house officers and visitors, gives directly to their studies and living apartments, and to stairs for their use, permitting access both to the upper floors, and to the



BLOCK PLAN OF CHRIST'S HOSPITAL SCHOOL.

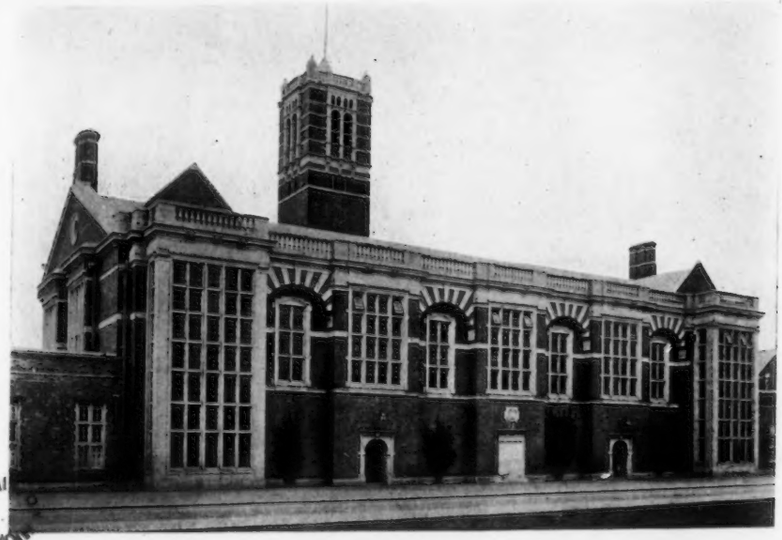
On the ground floor are the doctor's office, the dispensary where prescriptions are filled, and waiting rooms for the boys. Above is a large living room for convalescents. Behind the infirmary is the fever sanitorium consisting of an administration building, a scarlet fever building with room for thirty beds, and a diphtheria building with room for fifteen beds. As in the case of the infirmary each of these is in itself a fully equipped hospital with its wards, small bedrooms, nurses' quarters, kitchens and lavatories. Each one is a complete unit requiring no communication with the others, and kept in readiness for instant isolation from the rest of the school.

After passing the hospital group the road sweeps in a great curve past a line of dormitories, crosses the quadrangle near one end and continues past a second line of

service subway which connects all the buildings of the school. To each side of this central entrance are corridors leading to the boys' entrances which are located at the ends of the building. These give direct communication on the ground floor to large sunny day rooms under the supervision of two monitors whose studies open from them. They are provided with study tables and benches while along the walls are cupboards for books and papers. Across the corridor are changing rooms where every boy has his athletic clothes and bags for towels and soap. Adjoining are the shower baths. Thus the necessity for a central gymnasium is done away with. Indeed in a country where exercise out of doors is possible practically all the year and in a school where every boy is required to interest himself in some out-

LARGE HALL.

CHAPEL.



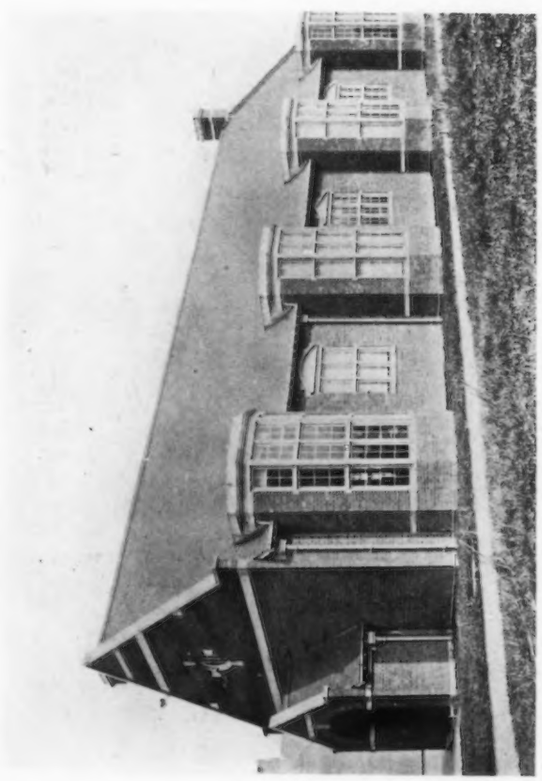
DINING HALL.

SCIENCE BUILDING.

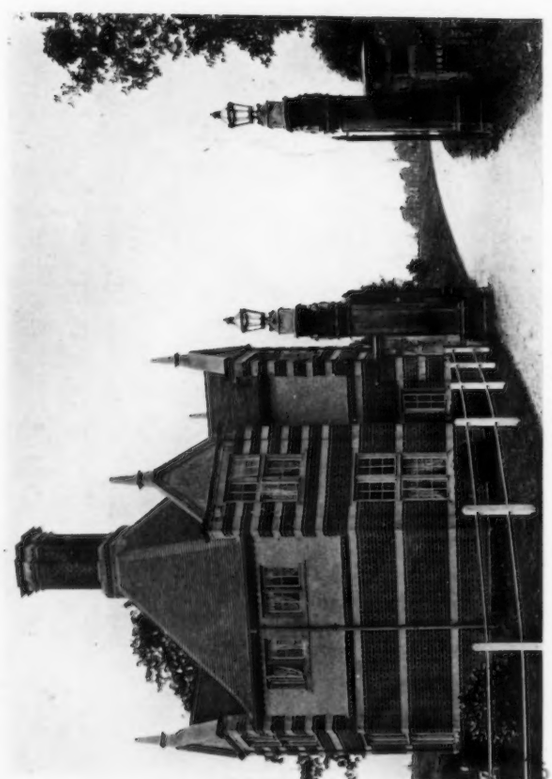
VIEWS OF CHRIST'S HOSPITAL SCHOOL,
HORSHAM, SUSSEX, ENGLAND.

VIEW OF GREAT QUADRANGLE.

MASTER'S HOUSE.

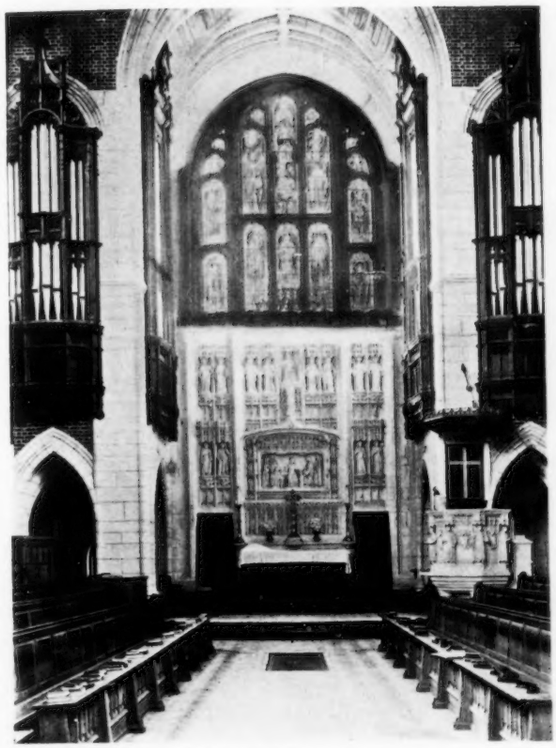


LIBRARY AND MUSEUM.

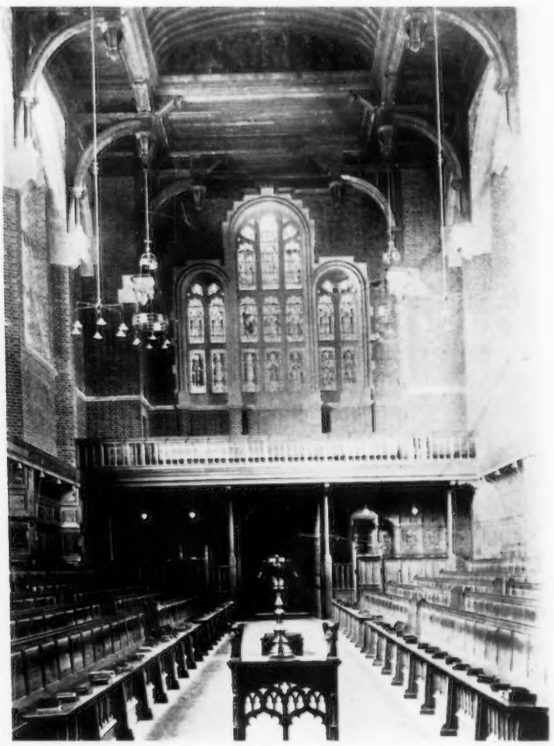


GATE LODGE.

VIEWS OF CHRIST'S HOSPITAL SCHOOL,
HORSHAM, SUSSEX, ENGLAND.



INTERIOR OF CHAPEL.



INTERIOR OF CHAPEL.

ENTRANCE TO LARGE HALL.

ENTRANCE TO DORMITORY.

VIEWS OF CHRIST'S HOSPITAL SCHOOL,
HORSHAM, SUSSEX, ENGLAND.

door sport, not once in a while, but regularly, this arrangement is much more satisfactory. On the ground floor are also boot rooms. The dormitory rooms in the second and third stories accommodate twenty-five boys each. The beds are ranged along opposite sides of the room as in a ward. At each end, separated by open air passages, are lavatories as above mentioned. Every boy is required each week to take two hot baths and a complete change of clothing. The school furnishes the clothes and while each boy keeps his own frock, trousers, and shoes, his underclothes are given out twice a week. In addition to direct ventilation from many windows each dormitory has a system of flues in the walls connected by trunks in the roof with a large ventilator on the ridge which contains a steam coil.

The drive enters the great quadrangle through the cloisters which run down the two long sides and which would be rather gloomy corridors were it not for the fact that they are partially open to the sun. To the right, at the foot of the quad, the dining hall, which seats the whole school, is so placed as to be most convenient both to the dormitories and to the class rooms. At the east end of the Hall is a dais with long tables for the masters and directly behind it the masters' common room. In back of the hall are the kitchens equipped with all the most modern culinary appliances and behind them again are the living quarters for the kitchen staff. The tower which rises above this group can be seen for miles around.

At the head of the quadrangle dominating the entire group is the great "Speech Hall" flanked by lower buildings containing the class rooms. The main entrance, a very successful piece of detail, opens into a spacious vestibule which gives access to the hall and by stairways to the balcony. The hall is approximately 130 by 50 feet and about 50 feet high with a seating capacity sufficient for the whole school. The pipes of the great organ are made to play an important part in the scheme of decoration and the timber roof treatment is not unlike that of Cardinal Wolsey's chapel in Hampton Court palace. Here, in striking contrast with the dining hall, there are ample exits at the rear and along the sides as well as along the front of the building. The north wall has set into it a bit of the original design executed by Sir Christopher Wren for the London school consisting of a pilaster treatment with pediment and a semicircular niche for a statue. The illustration will show that the composition is readily distinguishable from the rest of the wall because of the different character of the brickwork.

The chapel is placed with its side to the quadrangle and its front facing the avenue from which it is entered by a vestibule though access is also given by smaller doors opening into the cloisters. The scheme of plan is similar to the usual collegiate solution of the problem as seen at Oxford and Cambridge, consisting of a broad central aisle running the length of the chapel with seats in parallel tiers on each side. The interior treatment is very interesting. All woodwork is of oak left in its natural state. The walls are paneled to the height of the balcony floor, and above this the brick walls show, broken only by a stone line marking the base of the windows, by stone architraves, and stone corbels carrying the open timber roof which is also left in its natural color. The reredos screen and the pulpit are of very delicately carved Caen stone.

The science building, which balances the chapel, needs no comment except perhaps to call attention to the rather unusual wall treatment in the second story of the three projecting bays. The library and museum are in a small one story building of no particular interest. The manual training building, recently added, is in harmony with the rest of the group. In the center of the quadrangle is a very fine memorial monument arranged with seats on the four sides, and buttresses containing drinking fountains in small niches, at the angles. A life size statue of Edward VI surmounts the monument flanked on the corners at a lower level by statuettes of Coleridge, Lamb, Middleton and Maine, former students of the school who afterwards became famous. The figures are all represented in the school dress of frock and knickerbockers. In the quadrangle, which measures approximately 250 by 375 feet, one is impressed by the evidently intentional lack of trees and planting of any kind though the avenue of approach is well lined with young trees which offer a pleasant relief from the monotony of brick walls. Here however no attempt has been made to secure such relief, possibly in order to insure the full play of sunlight and the free movement of air which the authorities decided was of such importance to the health of the boys.

It might be interesting in closing to give some idea of the life led by the boys in this rather ideal school — which the neighboring townspeople speak of as the "Red City on the Hill." The school is conducted on a lenient military basis. The day is begun by chapel exercises at 7 o'clock to which the boys march by houses and from there to breakfast. The time from 8.15 to 12.15 is given over to class work. A recreation hour is then allowed before dinner after which work is again resumed at 2.15, and lasts until 4.15, when there is recreation again until 6, during which time practically every boy is engaged in some outdoor sport. The school clings to many old customs, as for instance, the uniform which has not changed since its foundation and consists of a heavy blue frock, reaching almost to the knees, blue knickerbockers, white stockings and black shoes with large buckles. This costume which seems to us somewhat cumbersome does not bother the boys at all. When playing their games they simply pull up the skirts and tuck them into their belts. Another old custom, more practical if less picturesque than the uniform, is the rule that every boy must black his own shoes and keep the pair he is not wearing for the day in condition to pass inspection. Each boy has a pigeon hole for his brushes and polish, and is held responsible for them. Still another custom which tends to produce in the boys a spirit of independence and an ability to help themselves is that of detailing certain boys each day to set the tables in the dining hall. No student is excused from this duty. The school it will be seen not only makes itself responsible for the mental and physical development of its seven hundred boys but concerns itself also with their morals and with their religious training, — in a word strives to make men of them. Certainly one would have to travel far to find a more manly looking set of boys.

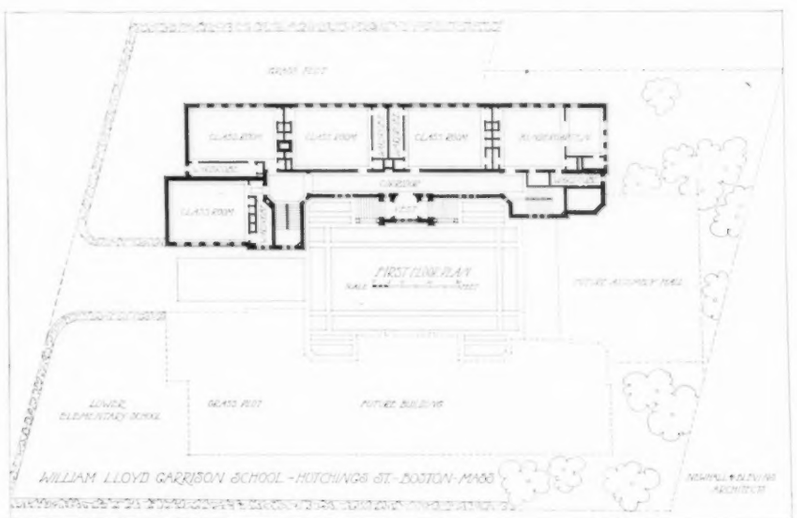
Some Problems in School Planning.

FIRST PAPER—THE ELEMENTARY SCHOOL.

BY R. CLIPSTON STURGIS.

WITH the concentration of life in great cities, and the consequent loss of that training which comes naturally in an agricultural community, there has arisen a demand for some training of hand and eye to supplement the purely mental exercise of the school. On the farm the ordinary everyday life gave exercise, and training in the use of tools; and in the villages and small towns the accessible country and the tool shed and household service gave varied occupation. In the large cities these important elements in education are not naturally present; even home and its housekeeping has disappeared more or less, and it was to provide such that the first movement toward broadening the school curriculum took place. The tool shed and the kitchen stove were introduced into the elementary school.

About the same time a movement was started to care for children who were below the school age. This again met a civic condition and was intended to solve a problem which in the country did not exist. There the little children could safely be about the house and out of doors without interfering with the ordinary day's work of the mother or occupying her time unduly, but in the city a constantly growing percentage of mothers was forced to work away from home and there was no one to care for the children. It was more to meet this civic condition than to carry out Froebel's theories in education that the kindergarten room is so well filled in the city school.



The plan for an upper elementary school arranged for future extension, assembly hall making connecting link on first and second floor, by Newhall & Blevins.

The equipment for all this work — cooking, manual training and kindergarten — meant added rooms and teachers; for at one end of the grades additional pupils were admitted, and at the other, additional instruction required special rooms. Both these added to the cost of elementary buildings and elementary instruction.

Along the same lines and to meet the same kind of demand — that is, to give what one might have expected the home to provide — were the sewing class, the school library, the drawing room; and each of these made demand for space and for teachers.

Up to this point each branch added to the elementary course was added with a view of giving the city child what the average country child got in home life.

The next step was to meet another civic condition, especially marked in manufacturing centers. At fourteen the child, whether or not fit mentally and physically, might be withdrawn from school and set to work. In many cases work meant tending a machine or some similar narrow occupation where education stopped and atrophied. Compulsory education presupposed conditions in the school and home which, especially among the foreign population, did not exist, and children were being dismissed from school, or rather withdrawn, before they had obtained the education which eight years of school life was supposed to give. Parents could not be forced to give them more and school authorities therefore suggested courses which might be expected to have a direct bearing on the wage-earning capacity of the child. This again meant added courses and equipment in the school curriculum, or, failing to reach the child before the working life began, opportunity for evening instruction; the one intended as an inducement to keep the child longer in school, the other intended to counteract the narrowing influence of factory work by supplementing and filling out the meager elementary education. Again this required added teachers and accommodation.

In the former, the useful courses serving as a bait are the industrial courses now being introduced here and there in the elementary schools (for the child of fourteen has not always finished his course here), and in the latter, the continuation schools of the simplest character.

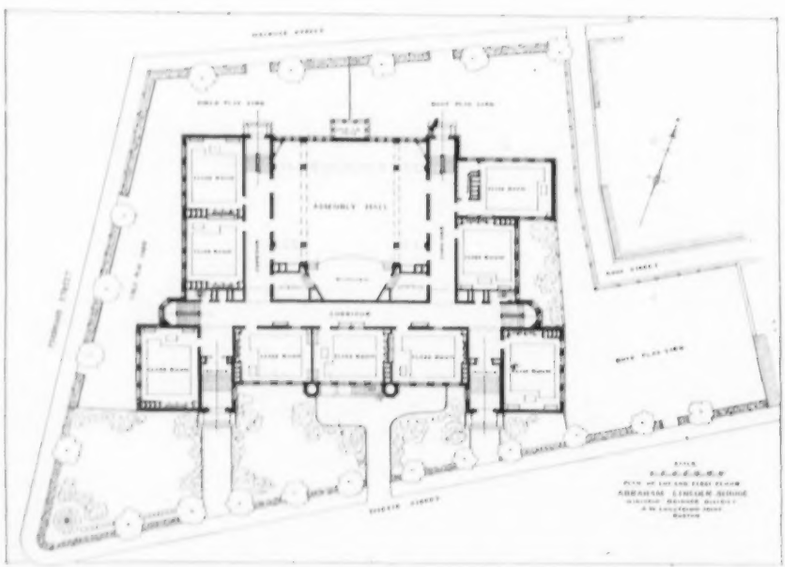
Thus far the changes in elementary school courses had been made largely if not wholly to make good something which had been lost.

(a) To replace what simpler conditions of life provided, there are added to the city elementary school, kindergarten, cooking, manual training, sewing and drawing.

(b) To meet the need of those who had not received at

fourteen years of age the education which was contemplated when that limit was fixed, there are added various courses which by their practical character may tempt the child to longer attendance until he has received the education which the age limit was meant to represent. These are courses which have a direct bearing on an occupation or trade — housekeeping or dressmaking, clerical work or mechanical. But it is not only to replace something that has been lost that educators now are striving, but also to make that advance in methods of education which is necessary to enable our children to cope with modern conditions and requirements. The early trader in foreign lands could exchange glass beads for gold and ivory, a bottle of fire-water for beaver and white fox; the modern trader, in sharp competition with his brother trader, must fight with well-trained brains for his market. Life is complex and education must conform to the complexity and supply the child with the weapons of modern warfare.

All this means rapid increase in the cost of building and maintaining our schools, and one is confronted with the question — not, is it worth while to do, but — is it worth what we are paying? or, still more to the point are we providing this very necessary education in an economical way?



A large upper elementary school of forty rooms by A. W. Longfellow. Assembly hall on first floor and all rooms arranged to have sunlight at times. Note that the only room with a northerly exposure has windows on south angle.

Before attempting to answer these problems one must consider the similar demands of modern education as they affect the secondary schools. The earlier types of secondary education were simply High and Latin Schools, the former fitted for the ordinary occupations of business and trade, the latter led to college and the professions. It is a long time now since a classical education has been a requisite for college, and but a small proportion of students go to college because they intend to teach or preach or practice law. The secondary schools instead of running smoothly in two well-defined channels, branch in innumerable directions, and the school is expected to guide the pupil along any of these courses.

The secondary school seeks to cover many fields, and indeed must cover them if it is to meet fully the demands of modern life. It must train for college and for technical schools; it must round out and complete as far as possible the education of those who go no farther, and prepare its graduates for a business career or for life as a mechanic or as a tradesman. More and more one finds that in every trade and occupation intelligence is of greater value than mechanical skill, and so the secondary schools must be equipped to train the clerk to more than using a typewriter and to give the mechanic more than just the ability to run a power lathe.

In the elementary school the problem is comparatively simple — to give some manual training and such industrial work as shall hold the children longer; in the secondary schools the problem is very complex. In large cities it may be met by a variety of secondary schools each having its special course — its special end in view — but in smaller communities where the demands are nearly as varied this cannot be done and some way must be found of offering the different courses in one building without too great expenditure for the apparatus.

The modern secondary school must lead on the one hand to further education, to academic colleges and to polytechnic schools, to commercial colleges and trade schools; and on the other hand it must train the child for good citizenship and effective work in almost any walk of life. To do this practically — that is so as to obtain the results — and economically — that is spending freely for what is necessary but nothing except that — is the modern problem in school planning and equipment. The first aspect of the problem is one for the educator to answer, the second is for the architect, and neither aspect has had sufficient study to make possible the intelligent planning of modern schools. Germany and England have advanced further than we, partly under force of necessity (with them it was a matter of vital importance to keep their foreign trade, and they believed rightly that education alone could accomplish this, and partly through organization. Here, we are not fully aware of the necessity, and are without organization. Completely content in the belief that we are among the great ones of the earth and self-sufficient, we seek indifferently the expansion of our trade. Communities, with like aims and objects, study independently and profit neither by the failures nor by the successes of each other.

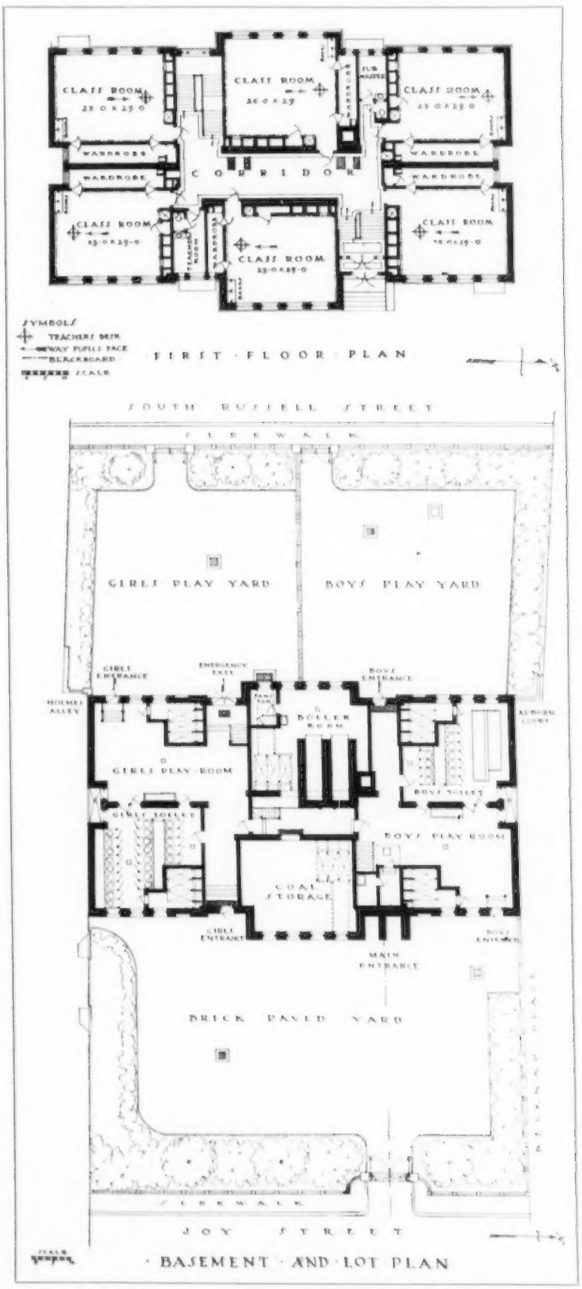
One is convinced that the country is now pretty well

aroused to the necessity of increasing the efficiency of the schools, and believes in organization for the study of the problem. The practical way to accomplish this would seem to be under the Commissioner of Education at Washington, before whom could be laid for tabulation the results of experiments throughout the country. Until such centralization is effected much effort will be wasted.

The following suggestions are based on observation in a narrow field and can be considered as suggestive only. They are the less useful because no one of the experiments in education has been sufficiently followed up to serve as a conclusive test of the efficiency of the instruction given. Until one knows that the cooking class has taught the pupils to cook one lacks assurance that the course in cooking is right, just as one suspects something amiss if eight years' schooling fails to teach the pupil how to write English, or even to spell.

It is proposed to take first the elementary schools, and then the secondary, and review in each (a) what is demanded, (b) what furnished, (c) what is accomplished, (d) what it costs, and then consider whether the same results could not be accomplished more effectively with simpler equipment.

In the elementary school the following are demanded: Kindergarten to take those who are below the school age (a matter not always easy to determine in towns filled with emigrants — Dr. Gulick suggests judging by teeth rather than birth certificates); cooking classes to train girls in the rudiments of the work in the home kitchen; manual training to give the boys (and girls too sometimes) a knowledge of the use of tools or control of their hands; sewing for the girls to help them to be useful at home; drawing for girls and boys to train eye and hand and teach some love of beauty; science, the simpler elementary things, to give them a better understanding of natural processes; the assembly hall, for common exercises, to teach them the value of concerted work, eradicate self-consciousness and encourage self-confidence; the gymnasium to train and harden the body and teach self-control and coöperation in sport; shops for wood and metal working or other general trades more advanced or more specialized than the manual training room to fit the boy to be a better wage-earner, or shops for dressmaking, millinery or domestic science to do the same for the girls.



A lower elementary school by James T. Kelley and Harold J. Graves, Architects. An exceptionally compact plan on a city lot running through from street to street, but without opportunity for light at the sides. All the rooms have east or west exposure.

In addition to all this indoors there is a demand for playground facilities outside where recreation in school time and the hours after school may be spent in play and sport for physical and mental development. Finally, many believe that even the city child should have nature-studies to bring him into touch with at least his native flora and fauna.

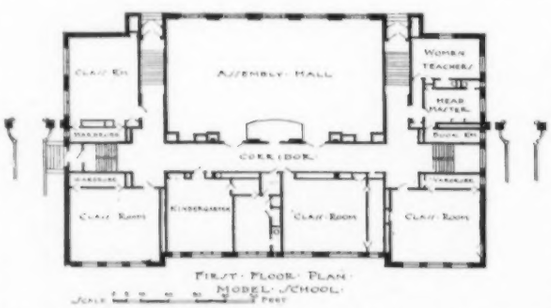
These are the demands made for the first eight years of the child's education; when added to the usual academic curriculum it makes a formidable list. With each of these branches one may consider what is provided, what is accomplished and what it costs.

The kindergarten is provided pretty generally in the elementary schools and serves the admirable purpose of a crèche where the children are cared for and kept off the streets. Educationally one hopes that the children learn something useful, perhaps cleanliness and obedience. If this is all the kindergarten does there is no very obvious reason why the city should not extend the scope and include the babies as well. It is worth study to determine how much one is justified in spending for this purpose. Rooms for fifty or sixty

occupy the space of a class room seating fifty and represent roughly speaking $7,500 of building.

The cooking room is generally provided and equipped for classes of twenty. Three or four classes a day for five days is about the limit of what one such room will serve. The equipment is simple and practical and it remains only to prove that the children are taught to do what will be of real use in the homes of their parents or in their own homes later. The work requires room and costs about what the kindergarten space costs ($7,500). But in this case no additional child is admitted; the room is used for additional instruction to the girls who have desks elsewhere. Both cooking and sewing are household occupations, and with them go cleanliness, neatness and order. One is inclined to doubt whether the teaching leads directly to its practical end, but if it does it would seem entirely feasible to put the results in practice in the school itself by having lunch (a growing necessity in many poor districts of our cities) provided by the girls of the second year cooking class and by having all the girls take part in the house cleaning and order of the class rooms.

What applies to the cooking for the girls applies with greater force to the manual training for the boys. This occupies the same space, costs the same and provides for the same number of pupils. For the most part they are occupied in somewhat purposeless work. The boy on the farm learns early to use tools to some purpose and gains thereby what no purposeless work can give. It would seem practicable to have all minor repairs about the school done by the boys who have proved themselves efficient and trustworthy. One is inclined to think that there would be rivalry to be allowed to do this work. Then while the girls kept class rooms clean the boys would polish desks and floors, set broken glass and replace window cords; and both girls and boys would take pride in their class rooms. Once the kitchen and shop became merely the training place for real work, a room in the basement or a shed might serve. The end after all is the training of the child and the only problem is how best to arrive at that end.



A standard type of plan for an upper elementary school with assembly hall on first floor. The building is three stories. This school, planned for a training school, contains all grades from kindergarten to the eighth.

Drawing like writing is but a training of the eye and hand, but unlike writing it is not expected that every pupil will learn to draw as all are expected to learn to write. Useful as drawing is, one is inclined to think that part at least of the time given to it might with advantage be devoted to writing. Practice in lettering is one of the best of all drawing exercises and is a help towards good handwriting. Drawing should be done in the class room and not add to the cost of the building. It is not a question of money expenditure but of time spent and the results of that time.

Such science as may properly find its place in the elementary schools does not require laboratories or lecture rooms, and except as incidental to other lessons is out of place. It does not require expenditure and may therefore be disregarded here.

The assembly hall is an accepted feature of nearly all elementary schools, certainly of all which include the upper grades, and that it is a useful and indeed a necessary part of the equipment cannot be denied. It is however a costly feature, and is often not used sufficiently to justify the cost. The smallest halls would represent two class rooms ($15,000) and the larger ones four to six rooms. Four rooms ($30,000) is a considerable investment, and one should be sure so to arrange for its use as to justify the cost. Twenty minute exercises once a day, occasional singing lessons and a few lectures — some of which are public — are not enough. A gymnasium is less frequently provided in elementary schools than a hall and yet the gymnasium would be in use all day and every day. It would seem entirely feasible to have the hall serve a double purpose. The morning exercises, reading and singing for the whole school, might be standing so that the floor would be available at once for classes, or the floor might be cleared of its benches in five minutes by the organized aid of the pupils. A hall for this double use might well be simpler than the somewhat pretentious rooms which now serve the architect as an opportunity for display of skill.

Ordered exercise and play do not occupy a sufficiently important place in the elementary school. One is inclined to think that the child in its active years of growth would study better if his mental work were frequently varied with physical exercise, and that education would gain by his taking part in organized sport where he will learn discipline and coöperation. This is all conjecture, but it appears worth considering.

The last, or rather the latest, demand is for study that may be called vocational — that leads to some definite end. In a way it is rather a misnomer, or a reflection on other studies, as if they had no practical end in view. Under this head would come typewriting and stenography, work in cloth, cardboard, wood and metal; trades innumerable when you once begin. Nearly all of these require additional space and special teachers, and only when the child is unable to get this education later or when only such opportunity will hold him in school at all does such work seem excusable in an elementary school. One may perhaps pass it by here to be considered later under the secondary schools, remarking merely that if introduced it should be only after such study as shall insure the accomplishment of the end in view. Generally speaking one is inclined to think that the kitchen and the shop, together with what can be done in the class room and the assembly hall, will give the child about all the instruction he can profit by during his first eight years of school. If this is supplemented by physical exercises and games that stimulate his interest while they exercise his body and give him some training in obedience and coöperation he will be fairly well fitted to carry his studies further, or, if this cannot be, to take up his work in life.

The Heating and Ventilation of Halls.

BY CHARLES L. HUBBARD.

THE chief difference between the methods employed for the ventilation of churches and halls depends upon the fact that it is usually necessary to keep the floor free for dancing and other purposes in case of the latter. This makes any system of finely divided air distribution, similar to those described in a previous article on church ventilation, out of the question.

For small and medium sized halls, where furnace or indirect steam heating is employed, the general methods

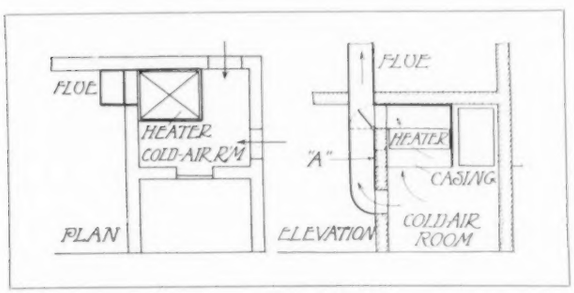


FIG. I.

and data already given in connection with church heating, apply equally well, except perhaps, the method of basing the various parts of the apparatus upon the number of occupants. With halls there is less uniformity in the relation between the exposed wall and window surface and the seating capacity; a hall often being simply a part of a building used for other purposes and having perhaps only one outside wall exposure. Again, there is commonly a wide variation in the ratio of floor space to cubic contents, which makes it better to treat the systems of heating and ventilation separately, basing the former upon the exposed wall and window surface, and the latter on the number of occupants. This same method is also applicable to churches where the proportion of exposed surface to seating capacity is out of the ordinary.

The heat units required per hour for warming a room of average wooden or brick construction may be found by the formula

(1) $H_1 = [(W \times 25) + (G \times 100)] \times E$

in which

H_1 = heat units required per hour.
W = outside wall surface, in square feet.
G = glass surface, in square feet.
E = factor for exposure, which may be taken as N, 1.32; E, 1.12; S, 1.0; W, 1.26.

When there is an unwarmed roof space above the ceiling, each 3 square feet of ceiling should be taken as 1 of outside wall, in applying the above formula.

The heat units required for warming the air for ventilation may be found by the formula

(2) $H_2 = (O \times C) \times 1.3$,

in which

H_2 = heat units required per hour.
O = number of occupants.
C = cubic feet of air per occupant per hour, which may be taken from 1,500 to 1,800.

The total heat units required for both warming and ventilating is the sum of the two quantities found above; or

$H_1 + H_2 = H_3$ = total heat units required per hour.

Having found the different values of H, other data may be determined as follows:

(3) $H_1 \div 250$ = square feet of *direct* radiation required for warming the room.
(4) $H_2 \div 700$ = square feet of *indirect* radiation required for ventilating the room.
(5) $H_3 \div 500$ = square feet of indirect radiation required for both heating and ventilating the room.
(6) $H_2 \div 1{,}500$ = square feet of steam blast coils for ventilation only.
(7) $H_3 \div 1{,}200$ = square feet of steam blast coils for both heating and ventilation.
(8) $H_3 \div 40{,}000$ = square feet of grate surface for furnaces or cast-iron sectional boilers.
(9) $H_3 \div 30{,}000$ = horse-power of tubular boilers.

If the room is heated and ventilated by indirect steam, add 1 square foot of grate surface to the boilers for each 100 occupants, to care for the aspirating coils in the vent flues. The flue areas for both supply and vent, in furnace and indirect gravity steam heating may be based on the number of occupants and made the same as for church heating, under like conditions. This also applies to cold-air supply ducts, both for furnaces and indirect stacks.

Tables of fan capacities already given, both of the centrifugal and disk types, apply equally well to the conditions of hall ventilation.

For furnace heating, the general arrangement of flues, with supply registers at each corner of the room, and vents at each end (one being in the front of the stage),

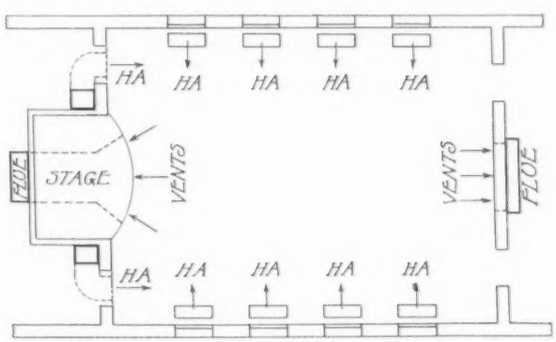


FIG. II.

is as satisfactory as any for halls of small size. This same arrangement may also be used in the case of indirect steam, supplementing it with supply registers along the outer walls beneath the windows in rooms of large size. The use of the cold-air rooms and multiple air-inlets should be retained if possible, as described for church heating. The method of locating one of the large corner heating stacks in the cold-air room, and the arrangement of casing and mixing damper is shown in

plan and elevation in Fig. I. The stack is hung from the ceiling in the corner of the room and enclosed in a galvanized iron casing with an open bottom which allows the air to pass freely between the sections of the heater. The cold air for the mixing damper is taken from a point near the floor, as shown, otherwise in mild weather, when the damper is set for nearly all cold air, the supply will become heated by passing across the *bottom* of the stack if the opening is made higher up, as at "A" for example.

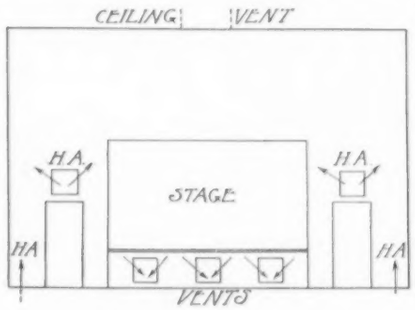


FIG. III.

A typical arrangement of supply and vent registers for a fairly large hall, heated by indirect steam, is shown in plan in Fig. II. In this case one-half the air supply is brought in through two large wall registers placed over the doors at either side of the stage, and the remainder through narrow floor registers along the sides of the room beneath the windows. If the outer walls are of sufficient thickness to carry an uptake flue these registers may be placed in the wall, instead of the floor, on account of cleanliness. This arrangement is often made possible by using a somewhat deeper window sill, and breasting out beneath it sufficiently to give the necessary depth for carrying the flue. A diagram representing a section through Fig. II, and showing the stage end of the room in elevation, is given in Fig. III. Part of the discharge ventilation is through registers or grilles in the front of the stage connecting with a flue in the rear, while the remainder of the air is taken off through a special flue at the opposite end of the room as indicated. In the case of small halls the necessary draft in the vent flues may usually be secured by the use of aspirating coils, but in larger rooms more positive results may be obtained by means of a discharge fan placed either in the attic or basement, as most convenient. A typical arrangement of an attic fan for the system shown in Fig. II is illustrated in Fig. IV. The two vent risers from the first floor are connected by horizontal ducts just above the ceiling with a fan chamber located at some convenient and central point. A direct-connected fan of the disk type is best adapted to this purpose on account of its light weight and ability to handle large volumes of air at low pressures.

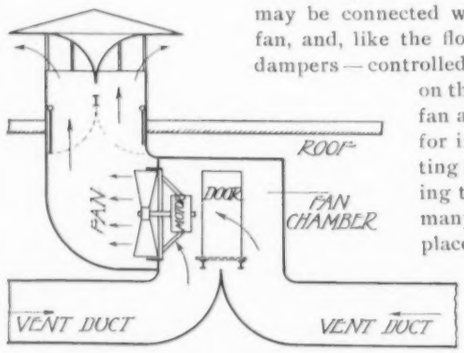


FIG. IV.

In the arrangement shown, the two horizontal ducts are brought into the bottom of the fan chamber by means of easy curves. The fan is placed in an opening in the side of the chamber with its shaft in a horizontal position, and discharges into an outboard flue provided with a hood and damper. If the attic space is limited as to height, the ducts may be brought into the sides of the chamber instead of the bottom, the fan and door occupying the two remaining sides. It will be seen by reference to Fig. III that ceiling vents are provided in addition to those at the floor. These are for use in mild weather and for quick cooling, should occasion require. They may be connected with the attic ducts leading to the fan, and, like the floor vents, should be provided with dampers — controlled from some convenient point, either on the first floor or in the basement. The fan and motor should be easily accessible for inspection and oiling, and a regulating rheostat should be provided for varying the speed to meet requirements. In many cases it will be more convenient to place the fan in the basement and connect the vent registers with the fan chamber by means of ducts beneath the floor. In this arrangement it is only necessary to carry a single vent uptake through the building, that leading from the fan outboard. In this case it is not possible to connect the attic vents with the fan, but this is not of so much importance because there is usually a good draft through these, due to the high temperature of the air at the upper part of the room. The duct from the ceiling vents may be connected into the fan discharge in the attic space, provided it is brought in on an angle with the direction of flow, so that the air from the fan flowing past the inlet will act as a suction. A common arrangement for a basement fan is shown in Fig. V. In this case the fan is placed directly in the base of the outboard flue, with its shaft in a vertical position. This reduces the resistance somewhat, as it does away with the 90° turn in front of

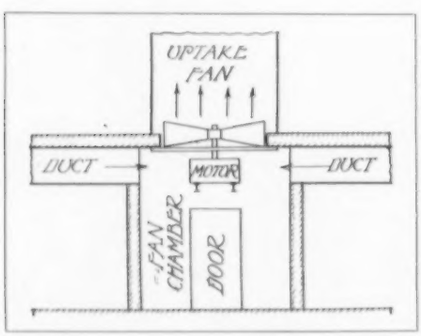


FIG. V.

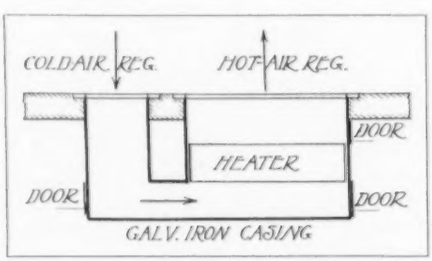


FIG. VI.

the fan shown in Fig. IV. On the other hand, the motor is more exposed to the weather, but this objection may be overcome by using one of the enclosed type and providing a good form of hood at the top of the flue.

The methods of determining the size of vent flues for fan ventilation has already been taken up in connection with churches and need not be repeated here. Before leaving the subject of gravity indirect heating, attention should be called to the necessity of providing means for air rotation, or inside circulation, for warming when ventilation is not required.

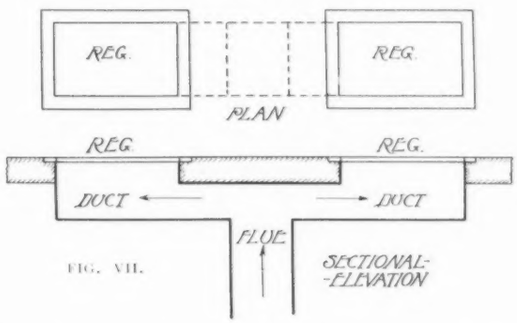


FIG. VII.

We now come to the treatment of large halls where a supply fan, usually of the centrifugal type, is used for providing the fresh air. In designing a system of this kind provision must be made for warming the room when the fan is not in use. There are various ways of doing this; one being to make the heating and ventilating systems independent, warming the room by direct radiation and making the main heater at the fan simply large enough for warming the air supply up to 70° in zero weather. By "direct radiation" is meant either the usual form of cast-iron sectional radiators which are placed in the room, or indirect stacks hung beneath the floor and arranged to take air from above as shown in Fig. VI. The ordinary form of direct radiator may often be concealed by breasting out beneath the windows sufficiently for enclosing the radiator, and providing grilles at the bottom and top to allow for a circulation of air over it.

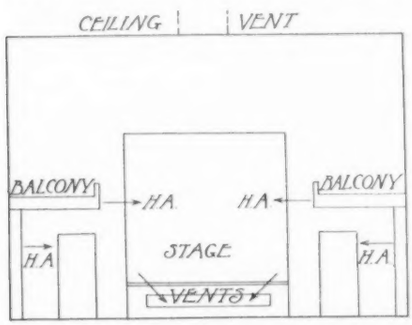


FIG. VIII.

When the main heater at the fan is proportioned for raising the total air supply through 70°, much of the time there will be more capacity than is needed for ventilation alone, and this surplus heat may be used toward warming the room and a portion of the direct radiation shut off. As the outside temperature rises, a point will be reached where the main heater will be sufficiently large to do both the ventilating and heating. If thermostatic control is placed upon the direct radiation this balance between the radiators and main heater will be maintained automatically. The main heater may be regulated partly by valved sections and partly by means of a by-pass damper, which if possible, should be automatically controlled. When the methods above described are objectionable, it is sometimes possible to make the main heater large enough to both heat and ventilate the room in zero weather, and divide it in two parts, placing one at each end of the basement near the bases of a pair of large flues. When both ventilation and heat are required, air is forced through these two heaters, by means of a fan into the flues; but when heat only is required, the air is admitted to the heaters from the basement by rotation, and passes upward into the room above by gravity, as in the ordinary form of indirect heating.

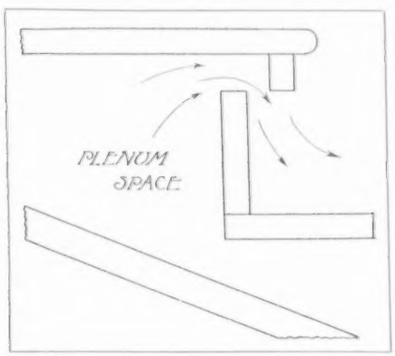


FIG. IX.

The method of air distribution differs from church heating because the floor must in general be kept clear, and all seats be removable. This makes it necessary to introduce the air in much the same manner as in gravity heating, that is, through a comparatively small number of large openings. Fig. II may also be used to illustrate a common method of locating the supply and vent registers for a fan system in which the heating is done by direct radiation (not shown).

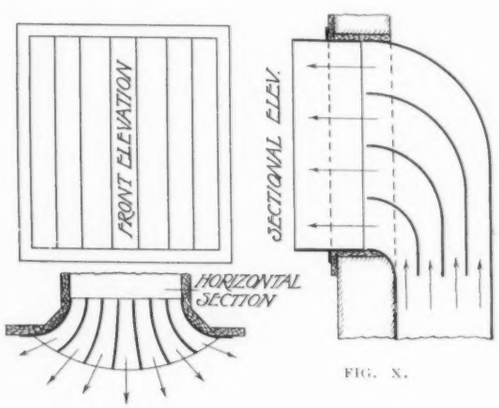


FIG. X.

The supply registers should be of practically the same size as for gravity heating, unless provided with diffusers, to be described later. The ducts leading from the fan to the flues may be based on an air velocity of 800 to 1,000 feet per minute, the lower velocity being in the smaller branches. In the uptake flues, the velocity should drop to about 500 feet in uptakes leading to floor registers, and 700 feet in those leading to wall registers which are placed at an elevation of 7 or 8 feet above the floor. In

the arrangement shown in Fig. II the vent flues may be made the same size as for gravity heating, but in general, no aspirating coils or vent fan will be required, as there will be sufficient pressure from the supply fan to force the air out. Exceptions to this would be in the case of large halls with deep galleries. When floor registers are supplied with air under pressure from a fan, it is well to place them in pairs and bring up the supply flue between them as shown in Fig. VII. This breaks the force of the current and causes the air to rise at a low and more uniform velocity over the entire surface of the register. In all cases adjustable dampers should be placed in the supply flues to equalize the flow of air to the different registers.

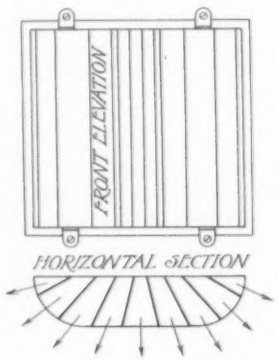


FIG. XI.

An arrangement which is used with good success in halls having a balcony upon two or more sides is shown in diagram in Fig. VIII. The air supply in this case is partly through wall registers placed about 7½ feet from the floor, and partly through registers in the front of the balcony. The lower registers tend to flush the space beneath the balcony with fresh air, while the body of the hall receives its main supply from the balcony registers. The discharge ventilation, for the most part, is through registers near the floor at either end of the room. Ceiling vents are provided for use on special occasion, as already described. No particular provision is made for the ventilation of the balcony. Where the hall is of good height the air currents induced by this arrangement of supply and vent registers will tend to change the air at frequent intervals in this portion of the room.

FIG. XII.

The ducts supplying the registers shown in Fig. VIII are carried in special pilasters for the vertical portion, and in the floor space of the balcony. When the air is supplied in this manner it is necessary to warm the room by independent means, usually by cast-iron radiators placed along the outer walls beneath the windows.

A method sometimes employed with good success is to use rotation heaters of the general form shown in Fig. VI for warming, and then connect the supply ducts from the fan with the casings beneath the heaters. The air can then be forced into the room without the use of additional floor registers. The effect on the heaters will be simply to increase their efficiency, and they may be shut off when their heat is no longer needed. Both registers become supply registers under these conditions and may be made of the same size. Sometimes the galleries of a hall, and even the main floor, in the case of lecture halls, are raised from the level; being in the form of a succession of broad stairs, each having one or more rows of seats. With this arrangement it is usually possible to utilize the space beneath as a plenum chamber and to introduce the air through slots in the risers as shown in section in Fig. IX. On account of keeping the floor free it is impossible to introduce the air in finely divided streams, as already stated. This makes it necessary to provide special means at the inlet registers to avoid unpleasant drafts, which are very likely to occur when air is introduced in large volumes at temperatures of 68 to 70°. A method of diffusing the entering air is shown in Fig. X. The vertical section at the right illustrates a series of deflectors placed in the flue back of the outlet into the room. These equalize the flow in horizontal planes, and a second set of vertical blades in front of these spread it in a fan-shaped stream as it enters the room. An arrangement of deflectors and diffusers of this kind takes the place of the usual inlet register.

When registers are already in place, drafts can often be done away with by placing a diffuser of the general form shown in Fig. XI over the register face. A system of ventilation, used more frequently abroad than in this country, is the *downward* system, where the air is introduced at the ceiling and

withdrawn at the floor level. This system is based on the theory that the warm air first rises to the upper part of the room, wherever it is admitted, hence it might as well be introduced at this point in the first place. The practical difficulty with this arrangement is that after a hall is once heated and filled with people, the animal heat given off is usually sufficient to maintain the desired temperature, and sometimes the temperature of the room will continue to rise even though no other heat be supplied. Under these conditions it becomes necessary to introduce the air at a temperature of 66 to 70° to maintain the proper conditions within the room. Air admitted through the ceiling at this comparatively low temperature is liable to fall quite rapidly and produce unpleasant drafts in different parts of the room.

Symphony Hall, Boston, an interior view of which is shown in Fig. XII, has a system operated on the method above described. Air is introduced through grille work shown in the panels of the ceiling and is removed through wall registers at the floor level and in the first balcony. Certain of these registers can be seen in the front of the stage and projecting above the back row of seats in the first balcony. The fresh air is drawn from the top of the building to the basement through a special shaft, where it passes through a heating coil, and is then forced by two 9 foot centrifugal fans, having a capacity of about 70,000 cubic feet per minute, to the space above the auditorium ceiling, where it is distributed to the various grilles by means of iron ducts. The air is removed from the building by means of two 7 foot centrifugal fans, also located in the basement. There is no direct radiation in this hall, except a small amount in the second balcony, and it is necessary to run the supply fans for warming the room at all times, although when once heated up it will retain the heat for a considerable length of time.

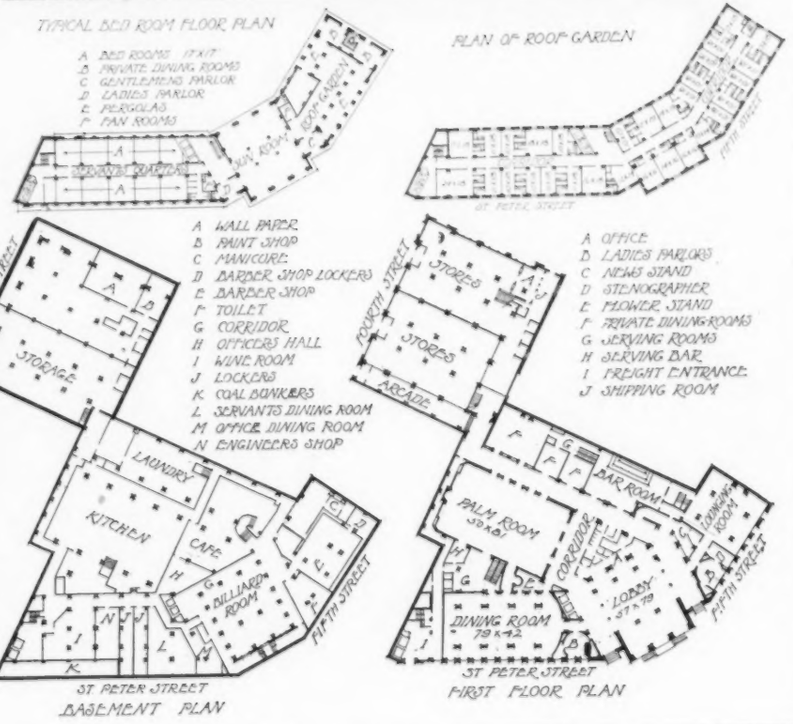
Plate Illustrations—Description.

Houses, Charles River Embankment, Boston. Plates 57–59. This group of houses fronting the new Charles River embankment and the wide basin beyond possesses something of the charm of the old Colonial homes of Boston and other New England towns. The houses have been designed not as an experiment in co-operative living, but rather to evade the apartment house and give to each occupant a distinctive and permanent home. The lot originally purchased in 1909 was 230 feet long and 152 feet wide, representing an assessed valuation of $113,800. The plan calls for a group of 22 houses, a courtyard 52 by 190 feet with a central planting space, a back alley 10 feet wide, an arched passageway 20 feet for teaming, and an entrance 16 feet wide to the parkway for driving. All the houses are three stories high except those at the rear which have an extra story. The typical plan is 20 feet wide and 45 feet deep with story heights of 8 feet 6 inches; 9 feet 6 inches; and 8 feet, respectively. The heating systems are hot air and hot water, suiting the wishes of the occupants. The typical plan shows a long, well-lighted library, a single flight of stairs, a small passageway or lobby leading to the dining room in the rear, and a serving room receiving secondary light. The alternative plan has a small front room which gives space for back stairs and a serving room lighted from the yard. The latter scheme is very satisfactory on the 18 foot lot No. 21 — which keeps the general character and accommodations of the adjoining 20 foot lot with a saving of approximately $900 in the cost of construction. The back part of the roof is used for drying clothes, the front part being restricted by mutual agreement. The plan that varies most from the typical is No. 16 which has a section over the archway. This house has a front of 20 feet and the conventional arrangement of the three stories, but over the arched passage is a large studio two stories high with a gallery at one end. The floors may at any time be carried through the studio giving several extra rooms. The exterior is of red water struck brick with the sills, caps and trim around the windows and cornices of light buff concrete stone resembling limestone. The outside woodwork is painted to match the stone trimming. The shutters are dark green and the doors white, green and mahogany. The site is made land with piling from 10 to 25 feet deep. The framing is all of hard pine, the floors of red birch, oak and hard pine and the wood finish generally white wood for painting. The houses cover 18,967 square feet out of a total area of 36,893 square feet, and cost approximately $225,000.

Yale Boat Club House, New Haven, Conn. Plates 60, 61. This building is built of red brick laid in wide joints and trimmed in terra cotta the color of limestone. The window quoins project slightly and the ornament has been concentrated in the gables, under the balcony rail on the river front and at the main entrance. This entrance is reached by means of a stone and brick arched bridge extending to the one over the Quinnipiac River. The roof is of slate. The pile foundations are covered with heavy stringers and protected by creosoted plank sheathing and surface filling. On the first floor is the entrance hall finished in light brick with stairs leading to the second story. Opening from the hall is the large boat room, beyond which is the workshop and the boiler room. Each of the six doors on the front has a run leading to the float which extends the entire length of the boat house. Upon the second floor is a large hall on the land side with a trussed ceiling, furnishing space for rowing machines, etc. The shower and drying rooms have slate lining and asphalt floors, while the toilet rooms are finished in marble. The lounging room has a brick and terra cotta mantel and a beamed and plastered ceiling between trusses. Doors open from the lounging room to the balcony, which is 36 feet by 56 feet and overlooks the river. The building contains approximately 410,000 cubic feet.

Church for St. Joseph's Parish, Dayton, Ohio. Plates 62–64. The exterior of this church is finished in iron gray brick, containing considerable purple to soften the general effect. The trimmings throughout are of

NEW ST. PAUL HOTEL, ST. PAUL, MINN.
Reed & Stem, Architects.



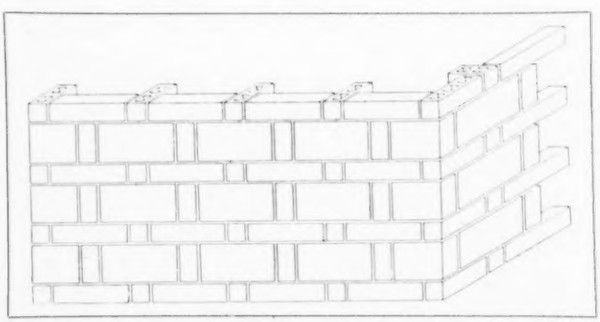
glazed terra cotta richly modeled, while flanking the main door-ways of the façade are tall columns of Vermont marble. A local stone of a very hard nature forms the base of the entire structure. The roof is of red tile and the exterior doors are of copper. The church is of Italian Byzantine design with a Basilican plan, the side aisles however being comparatively narrow and free of seatings. The nave which is 43 feet wide is ceiled by a barrel vault 45 feet from floor, with large semicircular windows in the clerestory and the apse semicircular in plan. The total seating capacity is 750. To the left of the wide vestibule in front is the baptistery with singing gallery overhead. Related to the aisles which are terminated at the sanctuary by niches are the confessionals, naturally lighted and ventilated. A suggestion of a cross axis has been contrived by bringing the tower into relation with a great niche on the opposite side of the church in which a marble Pieta is installed. Opposite to this semicircular shrine and within the walls of the tower is placed a minor choir gallery accessible from the tower stairs. Upon the interior the walls of the aisles up to the bottom of the windows are lined with tile of a soft green shade striped with thin horizontal lines of a slightly varying tone. The entire floor of the auditorium is laid with marbleized fiber which is of the monolith type. This is a greenish-gray field and in the aisles is bordered by broad simple masses of black. The sanctuary and its approaches are of marble and mosaic. The vacuum system of heating has been employed. Warm air is brought in near the entrance and is taken out by gravity at the tower. The cubical contents of the building is 577,600 feet and the cost per cubic foot 13 cents.

Church at Newton Upper Falls, Mass. Plates 65–67. The exterior design of this church was influenced by the Italian work, the portico being modeled after the Temple D'Auguste at Pola in Dalmatie. The sculpture in the pediment represents the miraculous appearance of the Blessed Virgin Mary to a French peasant girl. The campanile is of brick and cast stone — 125 feet from grade to top of tile roof and 15 feet square at base. The sides taper 4 inches in the entire height of the tower. There are four dial clocks with arrangements for chimes. Upon the interior is an open wood trussed ceiling. The decorations are in strong Pompeian colors. The stained glass panel over the vestibule doors and the twelve large windows are symbolical of Biblical scenes. The altar is of white marble with Numidian and Sienna columns and pilasters. The altar rail is of red Numidian marble on metal standards with gates ornamented in ecclesiastical symbols. The seating capacity of the basement is 450, the main church 800 and the gallery 100. The building, complete, cost approximately $80,000. There are 428,700 cubic feet, making the cost 18⅔ cents per cubic foot. The cubical contents were taken from the outside measurements of walls and 1 foot below floor to a point half way up pitch roof and includes portico, campanile, finished basement, etc.

New St. Paul Hotel, St. Paul, Minn.

REED & STEM, ARCHITECTS.

THE new million dollar St. Paul Hotel, at St. Paul, Minn., is the first building in this country to be built with exterior walls of interlocking machine-made terra cotta hollow blocks. All the stories between the second and ninth floors are built of this material. The blocks are of an old gold color, and are provided with projections which close the horizontal openings of the stretcher block, thereby making it impossible for the mortar joint to fall out. Being of the interlocking type they enormously increase the side pressure which a given wall will stand. This type of block demands a Flemish bond of one vertical and one horizontal alternating. The horizontal block is made from two to four times the length of the vertical. Large as well as small units can be made which enable the architect to carry out unique and original design. In combination with architectural terra cotta, this material is capable of giving strikingly beautiful effects at a reasonable cost. The blocks being much lighter than bricks are particularly well adapted for use in high buildings, where the weight of the walls is carried by steel or concrete piers — also for partition walls where great resistance against side pressure is wanted with a minimum weight.



SECTION OF WALL SHOWING INTERLOCKING BLOCK CONSTRUCTION.

The distinctive feature in this work is in the alternating use of a block with horizontal and vertical openings. The blocks with the vertical openings have locks on both sides which project into the horizontal openings of the stretcher block.

The size of the block used in this hotel is 8⅛ by 16¾ inches, with an interlocking block of 4 by 8⅛ inches for one course, and for the other course a 4 by 16¾ inch stretcher, with a 4 by 4 inch interlocking block. This 4 by 4 inch interlocking block extends 8 inches backwards, thus bonding with the backing brick or tile. This method of bonding is not absolutely necessary since ordinary wall ties will answer the purpose.

The advantages of this material for large structures are obvious on account of the extreme lightness in weight. If a building is properly spaced no cutting is necessary, although the blocks cut easily.

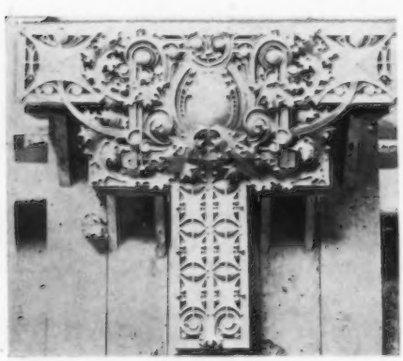
Editorial Comment and Miscellany.

WE WISH to call the attention of our readers to a series of three articles, the first of which appears in the present issue. They treat of certain fundamental considerations affecting the study of economical planning and construction of schools. Mr. Sturgis, who contributes the articles, served the city of Boston for some years on the commission which has charge of its school buildings, and during those years not only came in contact with others who were engaged in similar work in this country but also had opportunity to see something of the school work of other countries.

EXTERIOR DETAIL OF FITZGERALD BUILDING, TIMES SQUARE, NEW YORK CITY.
Executed entirely in white mat glaze terra cotta by the Atlantic Terra Cotta Company.
Geo. Keister, Architect.

The subject is treated from a point of view that is somewhat novel as applied to schools, and yet is clearly fundamental, and is simply the application to school problems of what is a commonplace in the study of business problems.

An owner planning an office building would study first the floor plan to assure himself that he had all the available rentable area that was consistent with good service, elevators, stairs, corridors and toilets. These papers show the same study applied to schools to produce a compact plan, and for the purpose of eliminating space that is not necessary; on the broad ground that it is better to eliminate 30,000 useless cubic feet costing 22 cents a cubic foot than to save one cent per cubic foot by poorer material or construction in 600,000 cubic feet of school building.



DETAIL BY A. L. DORR, ARCHITECT.
Made by American Terra Cotta & Ceramic Co.

The articles are largely suggestive and do not pretend to bring such study to definite conclusions, but they should lead the way to more thoughtful planning of schools, especially of those that are planned to meet the varied requirements of secondary education.

Economical school planning is often spoken of as if it were solely a matter of cost per cubic foot, without regard to what is contained within the walls. The present articles are intended to suggest the lines along which study might be made to determine what should be contained within the walls of a modern school. The first article treats of the requirements of elementary schools, the second of secondary schools, and the third treats of questions of hygiene as bearing on construction, and the final tests of economy.

DOME OF ST. JOHN THE DIVINE, NEW YORK CITY.

THE large Guastavino tile dome which covers the nave of the Cathedral of St. John the Divine, New York City—an interior view of which is shown in this issue—is one of the four great domes of the world constructed of masonry. It is 135 feet in diameter, measured across the lower part of its spherical surface. The thickness of the dome is 7½ inches at the base and decreases to 3¾ inches at the crown. Approximately one hundred

CORBEL TO BUTTRESS PANELS, FACTORY BUILDING, NEW YORK CITY.
Executed by the South Amboy Terra Cotta Company.
Shire & Kaufman, Architects.

DETAIL FOR HEARST BUILDING.
Executed in polychrome enamel terra cotta by Northwestern Terra Cotta Company.
James C. Green, Architect.

thousand tiles were used, measuring 6 inches by 1 inch with their length varying from 15 to 18 inches. The dome weighs approximately 50 pounds per square foot, with a total weight of 500,000 pounds. All portions of the dome were at all times self-supporting and no false work or centering was built to hold up the dome during its construction.

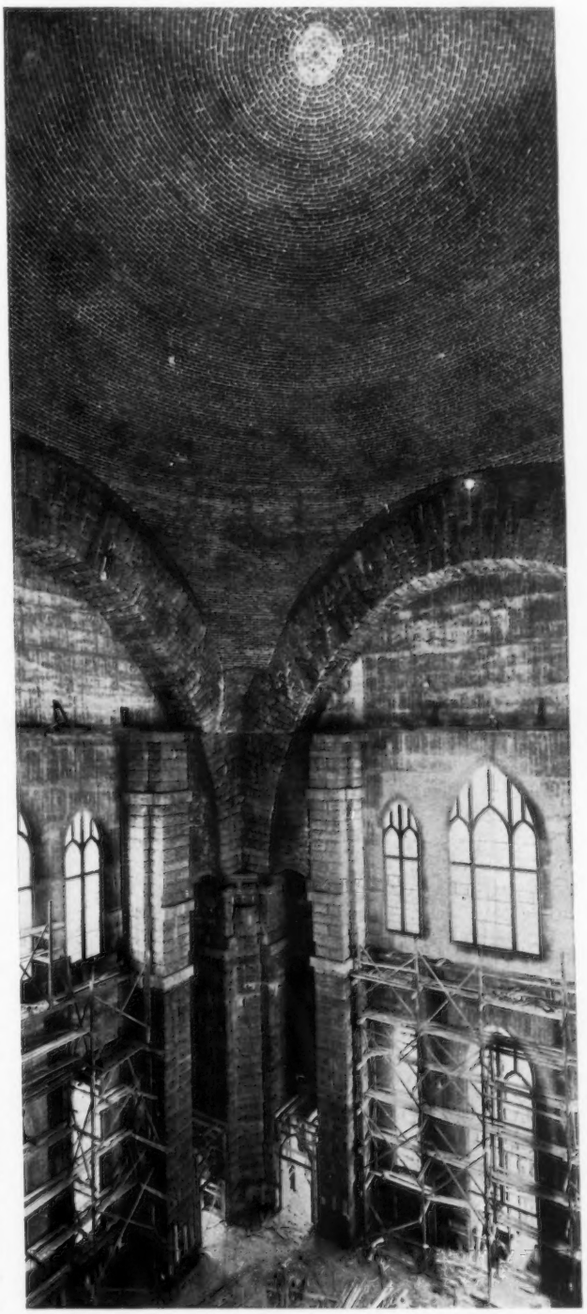
INTERLOCKING TERRA COTTA HOLLOW BLOCKS.

THIS material, which was used in the construction of the new St. Paul Hotel, at St. Paul, Minn., has been patented by F. Koch, President of the Twin City Brick Company, and a factory devoted entirely to its manufacture has recently been erected at St. Paul. The blocks are made in old gold, olive green, bronze brown, and mottled colors. Owing to the lightness of their weight, they can be delivered at a reasonable price in any part of the United States. The cost of laying is somewhat less than that of ordinary face brick. In addition to the St. Paul Hotel, they have been used in several other types of buildings, including houses, both large and small. A special rose-tinted tile is now being made which is suitable for interior wainscoting. The interlocking device gives a firm bed for the joint and strengthens the partition wall. Spacing sheets showing dimensions of piers and openings enabling the architect to space his elevation will be furnished by the manufacturers on request.

DETAIL BY J. N. PIERSON & SON, ARCHITECTS.
Made by New Jersey Terra Cotta Company.

PENNSYLVANIA BUILDING LAWS REVISED.

AT THE annual meeting of the Pennsylvania State Association of Architects, held at Harrisburg, May 2d, resolutions were adopted regarding the appointment of a commission to revise and codify the building laws of the State. The Association deplored the unsystematic and fragmentary character of the Acts of Assembly with reference to the construction of buildings and the safeguarding of life and property. They endorsed the Joint Resolution introduced into the Senate providing for the appointment of a commission to investigate the



INTERIOR OF DOME, CATHEDRAL OF ST. JOHN THE DIVINE, NEW YORK CITY.
Showing dome of Guastavino construction.
Heins & LaFarge, Architects.

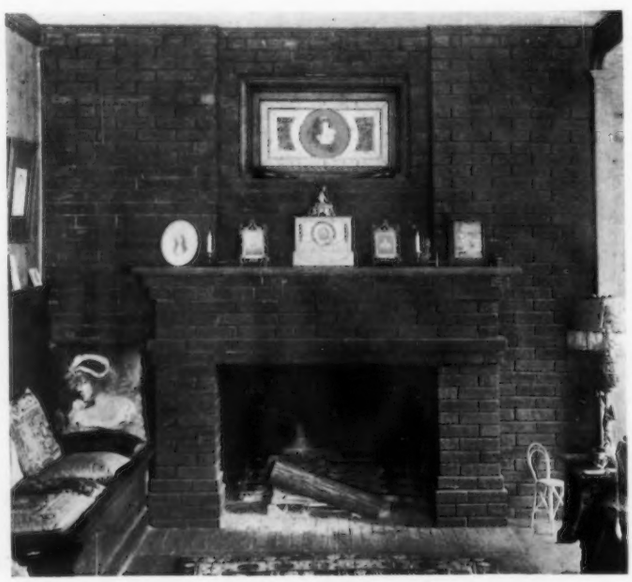
CITY INVESTING BUILDING, BROADWAY, NEW YORK.
Terra Cotta furnished by the New York Architectural Terra Cotta Company.
F. H. Kimball, Architect.

manner of construction of buildings in the Commonwealth of Pennsylvania, and to determine the strength and character of materials in order to safeguard the health and life of persons occupying the same, and to codify the laws in relation to buildings.

RESTORATION OF OLD CONGRESS HALL, PHILADELPHIA.

SIXTY THOUSAND DOLLARS has been appropriated for the proper restoration of old Congress Hall, Philadelphia, and for erecting memorial lamps in Independence Square. The work will proceed at once with drawings from data collected by the Philadelphia Chapter of the American Institute of Architects. In the absence of any original plans this data was obtained by digging up floors, tearing away parts of walls, probing ceilings, and scraping away plaster, to ascertain where partitions and stairways were erected as the building originally was designed. In addition to this, historical accounts of how the interior was arranged have been examined.

WOODWARD BUILDING, WASHINGTON, D. C.
Exterior of gray Norman "Craftsman" brick, laid in Flemish bond, furnished by the Pearl Clay Products Company.
Harding and Upman, Architects.



FIREPLACE OF "TAPESTRY" BRICK.

IN GENERAL.

H. S. Bill, architect, New York Life Building, Kansas City, Mo., desires manufacturers' catalogues.

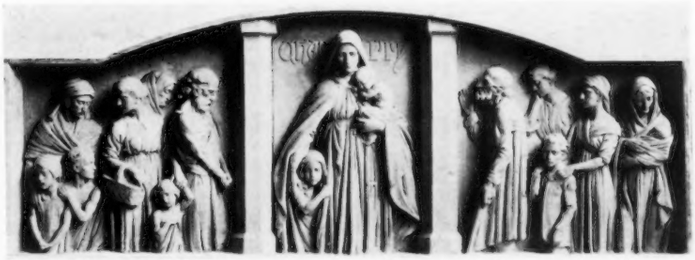
Wheelwright & Haven have formed a partnership with Edward H. Hoyt and will continue the practice of architecture under the firm name of Wheelwright, Haven & Hoyt; Offices, 220 Devonshire street, Boston.

The new plant, Number 2, of the Western Brick Company, at Danville, Ill., is now in full operation, producing a line of mat faced and flashed brick.

Fiske & Co., Inc., have removed their New York office to the Arena Building, 32d street, one door east of Broadway. Here they have installed a most remarkable exhibit of their full line of brick.

The American Terra Cotta & Ceramic Co., of Chicago, have

removed their offices from the Chamber of Commerce Building, to Peoples Gas Building, Michigan avenue.



DETAIL FOR HOSPITAL.
Executed by the Conkling-Armstrong Terra Cotta Company.

In a booklet recently issued the Atlantic Terra Cotta Company show their new line of Garden Pottery, etc., including vases, window boxes, sun dials, pedestals, and bench legs. The booklet contains not only illustrations of a large variety of types, but the sizes, colors, and prices are also given.

The New York office of the Hartford Faience Company has been removed to 4 East 42d street.

The brick used in the two houses at Pittsburg, Pa., MacClure & Spahr, architects, illustrated in this issue, was furnished by Fiske & Co., Inc.

"**SPECIFICATION BLANKS**," by T. Robert Wieger, architect (formerly with F. E. Kidder). Forms for all classes of buildings, each trade separate. Complete set, 44 pages, 25 cents. Reduction on quantities. Sample page upon request. 628-14th street, Denver, Colo.

HOUSE AT DULUTH, MINN.
Brick furnished by the Ironclay Brick Company.
W. A. Hunt, Architect.

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"TAPESTRY" BRICK

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BULLETIN

RECENT WORK, illustrated in this issue of THE BRICKBUILDER

Two Houses at Pittsburg, Pa. . . . . . Plate 69
MACCLURE & SPAHR, Architects

Fireplace of "Tapestry" Brick . . . . . Page 112

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Registry of Deeds, Salem, Mass. C. H. Blackall, Esq., Architect.

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The tile used upon the interior of the Church for St. Joseph's Parish, Dayton, Ohio, illustrated on Plates 62-64 in this issue, was furnished by The Rookwood Pottery Company.

The terra cotta used in the Church for St. Joseph's Parish, illustrated in this issue, was furnished by the Atlantic Terra Cotta Company.

A. L. Dorr, Minneapolis, has formed a copartnership with his son, William Grey Dorr, for the practice of architecture, under the firm name of Dorr & Dorr, Offices 1132 Lumber Exchange.

HOUSE AT ST. LOUIS, MO.
Exterior of red pressed brick, furnished by the Hydraulic-Press Brick Company.
Wm. A. Lucas, Architect.

Work has been started on the Hotel McAlpin, Broadway, between Thirty-Third and Thirty-Fourth streets, New York City. This building will be twenty-five stories high. F. M. Andrews, the architect, estimates that the total cost will be approximately $14,000,000.

COMPETITION FOR A SMALL HOUSE TO BE BUILT OF NATCO HOLLOW TILE.

Cost of House not to Exceed $6,000.

FIRST PRIZE, $300. SECOND PRIZE, $200. THIRD PRIZE, $150.
FOURTH PRIZE, $100. MENTIONS.

PROGRAM.

THE problem is a small detached house to accommodate a family of four with one maid. The outer walls and foundations of the house are to be built of Natco Hollow Tile.

The location may be assumed in any town, small city, or suburb of a large city.

The cost of the house — exclusive of the land — shall not exceed $6,000. The method of heating, the plumbing, other fixtures and finish, to be governed by the limit of cost.

Many houses of this type of construction have recently been built in different sections of the country, and from the data which has been gathered concerning the cost of a large number of these houses, an average price per cubic foot has been obtained. This cost is given as the basis upon which the size — figured in cubic feet — of each house submitted in this Competition must be approximated. The price is 20 cents per cubic foot.

Measurements of the house proper must be taken from the outside face of exterior walls and from the level of the basement floor to the average height of all roofs. Porches, verandas and other additions are to be figured separately at one-fourth (25 per cent) of their total cubage. The cost of porches, etc., is to be included in the total cost of the house ($6,000).

On this basis of figuring — the number of cubic feet multiplied by the cost per cubic foot — the jury will not consider any designs which exceed the limit of cost.

There are no restrictions as to the shape and style of the house or the size and location of the lot.

The particular object of this Competition is to encourage the study of the possibilities in the use of Natco Hollow Tile in the exterior walls of houses. Here is a durable material which will insure a house being warmer in winter, and cooler in summer; easily meets in all respects the demands of the designer, and gives to the house that permanent value which is lacking in the more perishable materials. A house can be built of this material at very little more cost than one built of wood, or of plaster on wire lath and stud. The walls are knit together as solidly as if built of stone. The cost for up-keep is nothing. Any mason of average ability can easily do the work.

CONSTRUCTION.

The following suggestions are offered as being practicable and admissible.

First. Outside walls may be of Natco Hollow Tile 8 inches thick (8 inches by 12 inches by 12 inches). Foundation walls, below grade, should be not less than 12 inches thick. The blocks being heavily scored on two sides, stucco may be used for an outside finish and plaster applied direct to the block for interior finish.

Second. The walls may be built double using in the outside wall a 4-inch hollow tile, and on the inside a 6-inch tile. The treatment of the face of such a wall, and the manner of bonding the outer and inner walls are left to the designer.

The floors and roof need not be of fireproof construction.

DRAWING REQUIRED (there is to be but one).

On one sheet a pen and ink perspective, without wash or color, drawn at a scale of 4 feet to the inch. Plans of the first and second floors at a scale of 8 feet to the inch. A section showing construction of exterior wall, with cornice. A sketch showing detail of front entrance. In connection with the plan of the first floor show as much of the arrangement of the lot in the immediate vicinity of the house as space will permit. The plans are to be blocked in solid. A graphic scale must accompany the plans. The character of the exterior finish must be clearly indicated on the perspective and detail.

The size of the sheet is to be exactly 34 inches by 22 inches. Strong border lines are to be drawn on the sheet 1 inch from edges, giving a space inside the border lines 32 inches by 20 inches. The sheet is to be of white paper and is not to be mounted.

The drawing is to be signed by a *nom de plume* or device, and accompanying same is to be a sealed envelope with the *nom de plume* on the exterior and containing the true name and address of the contestant.

The drawing is to be delivered flat, or rolled (packaged so as to prevent creasing or crushing), at the office of THE BRICKBUILDER, 85 Water Street, Boston, Mass., on or before June 26, 1911.

Drawings submitted in this Competition are at owner's risk from time they are sent until returned, although reasonable care will be exercised in their handling and keeping.

The designs will be judged by three or five members of the architectural profession representing different sections of the country.

First consideration will be given to the fitness of the design, in an æsthetic sense, to the materials employed: Second — the adaptability of the design, as shown by the details, to the practical constructive requirements of the material.

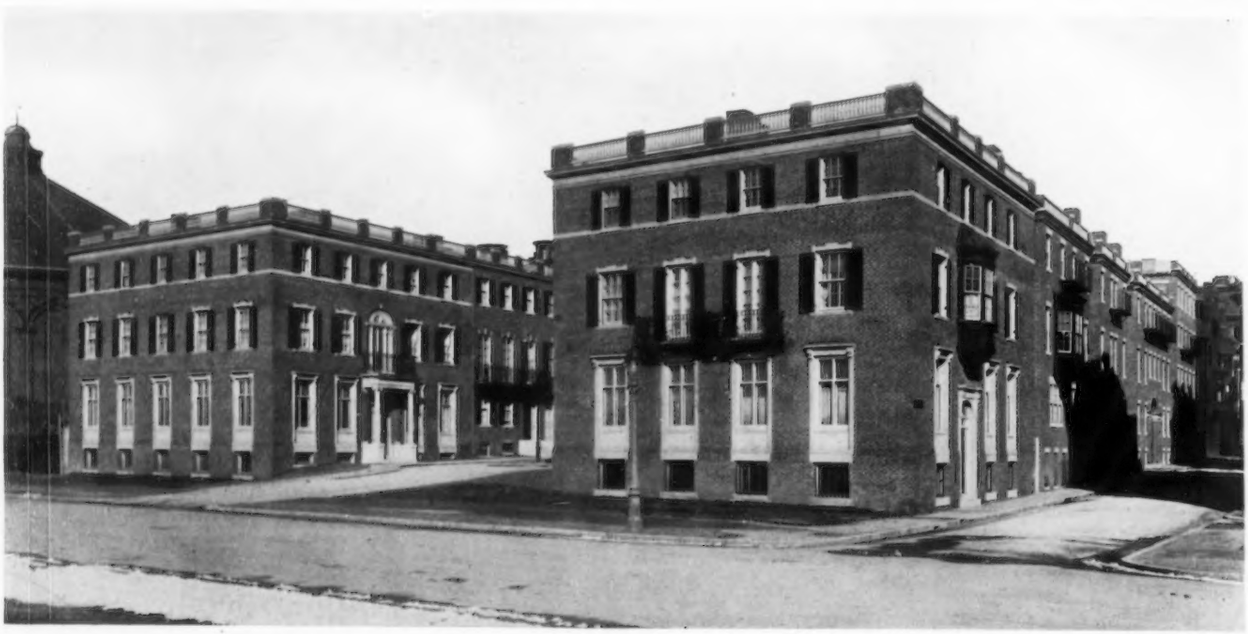
Drawings which do not meet the requirements of the program will not be considered.

The prize drawings are to become the property of THE BRICKBUILDER, and the right is reserved to publish or exhibit any or all of the others. The full name and address of the designer will be given in connection with each design published. Those who wish their drawings returned, except the prize drawings, may have them by enclosing in the sealed envelopes, containing their names, ten cents in stamps.

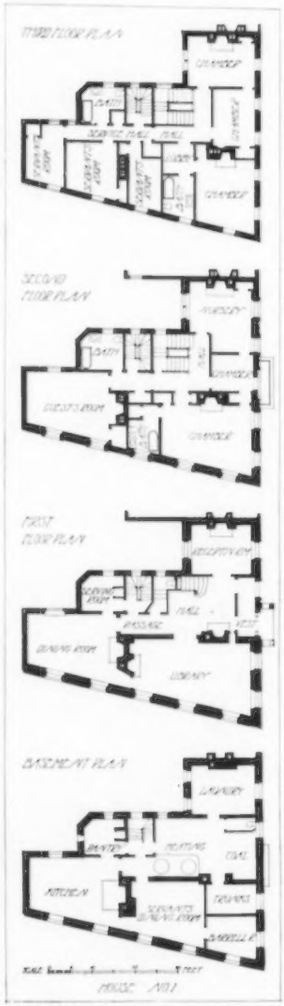
For the design placed first there will be given a prize of $300.
For the design placed second a prize of $200.
For the design placed third a prize of $150.
For the design placed fourth a prize of $100.

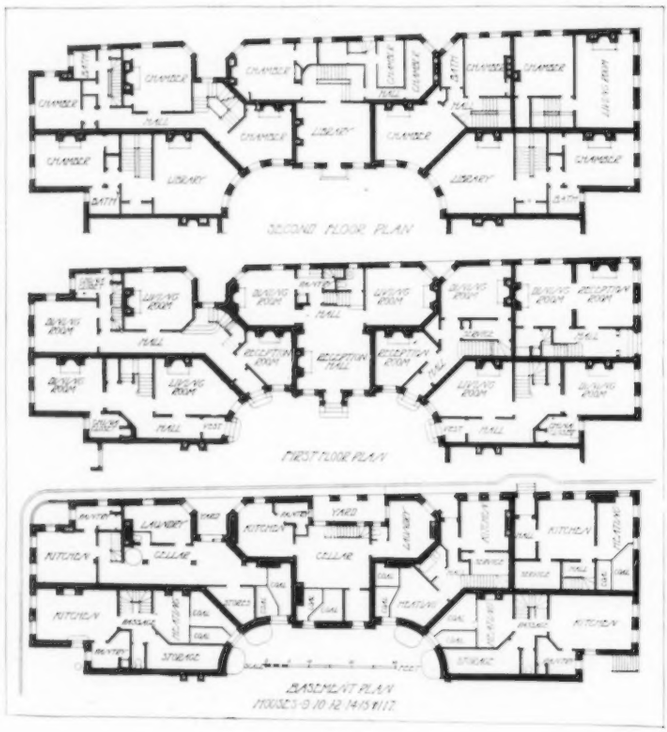
This Competition is open to everyone.

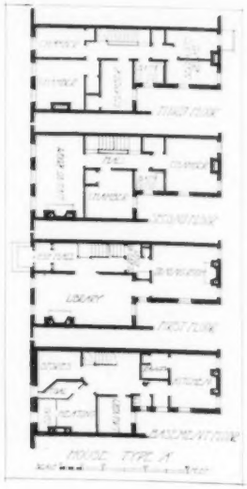
The prize and mention drawings will be published in THE BRICKBUILDER.

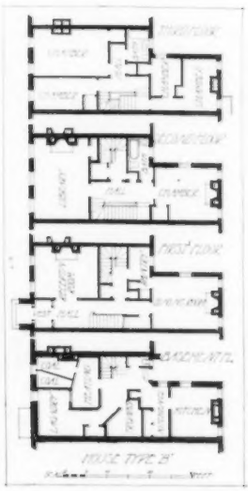


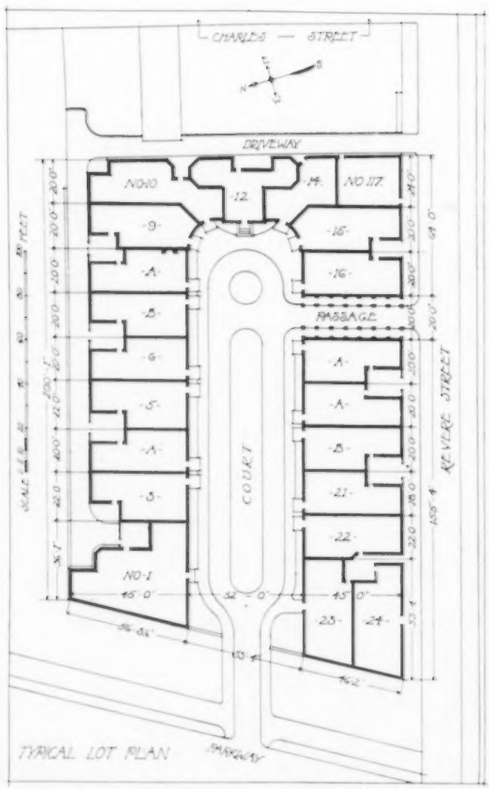
HOUSES ON CHARLES RIVER EMBANKMENT, BOSTON, MASS.
FRANK A. BOURNE, ARCHITECT.

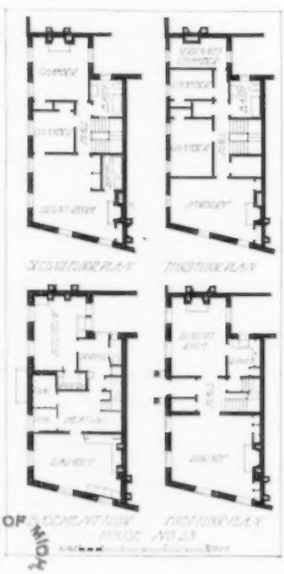


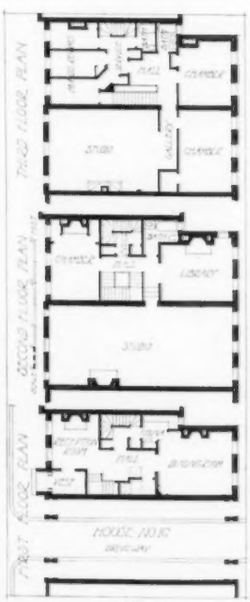












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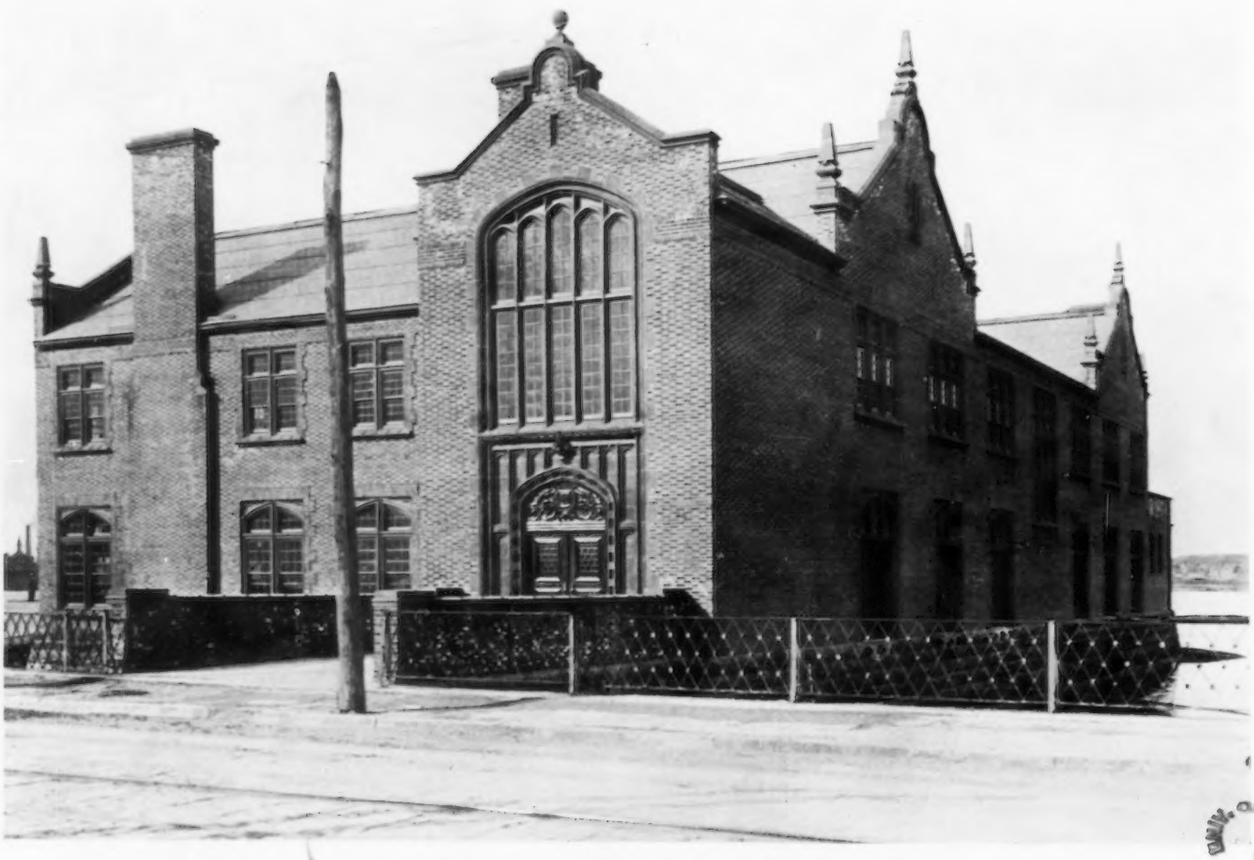
HOUSES ON CHARLES RIVER EMBANKMENT, BOSTON, MASS.
FRANK A. BOURNE, ARCHITECT.

PASSAGE

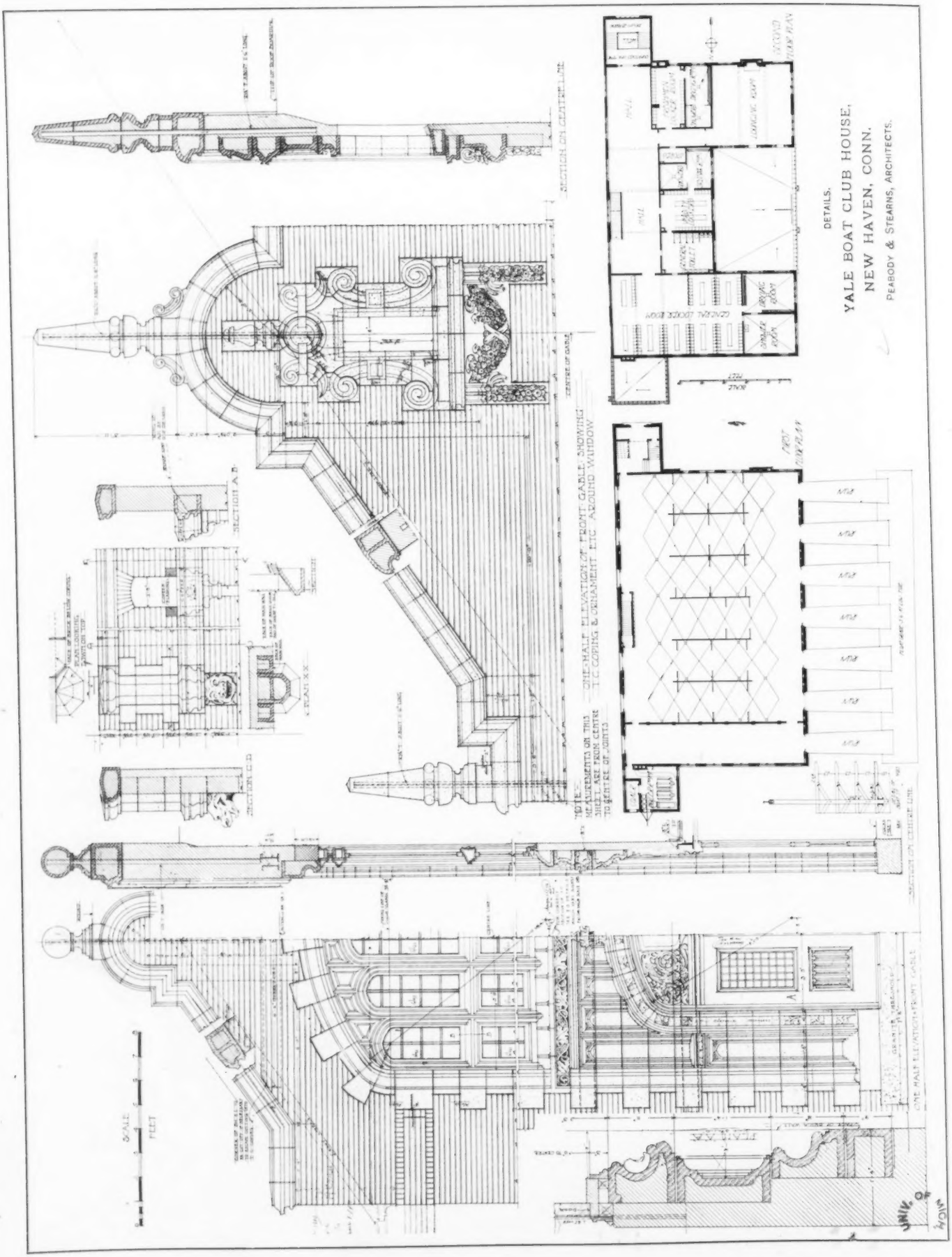
HOUSES ON CHARLES RIVER EMBANKMENT,
BOSTON, MASS.

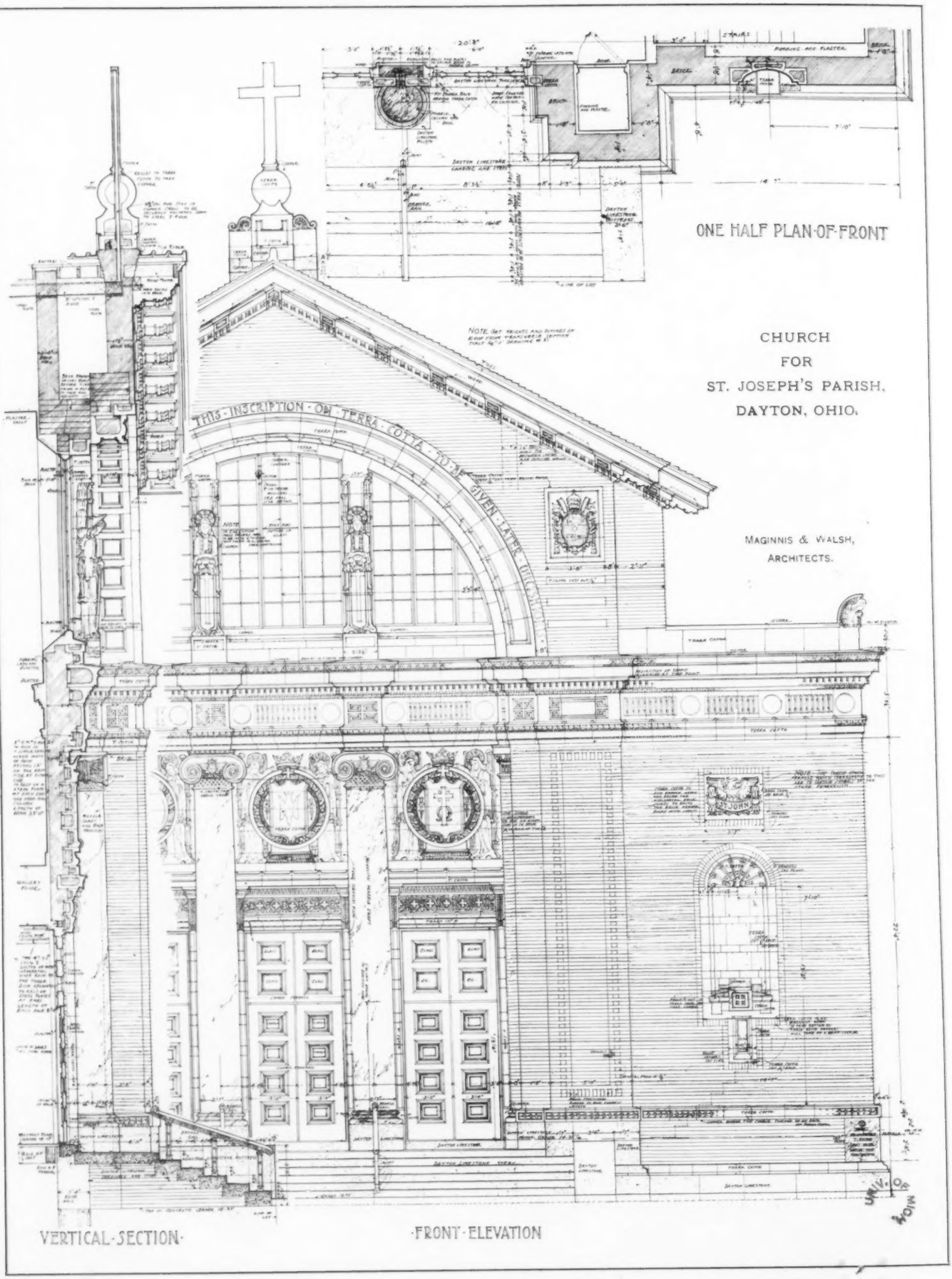
FRANK A. BOURNE, ARCHITECT.

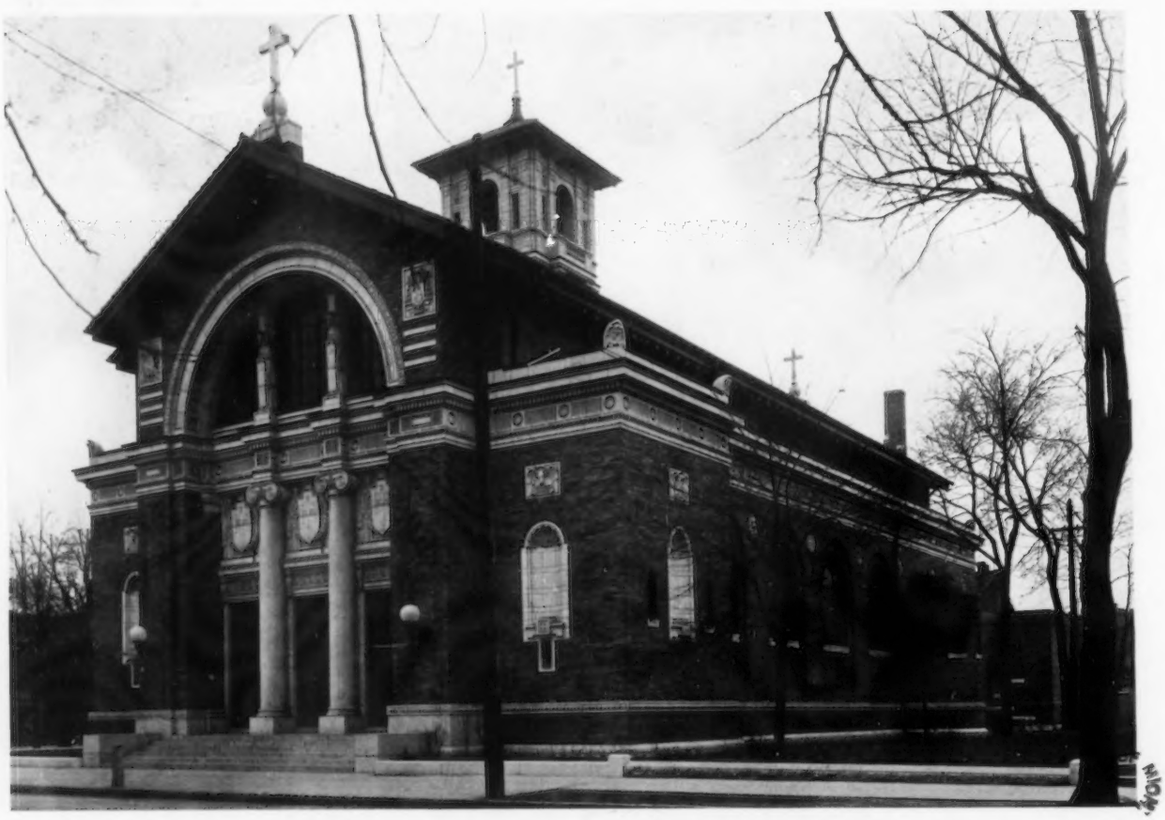
LIBRARY.



YALE BOAT CLUB HOUSE, NEW HAVEN, CONN.
PEABODY & STEARNS, ARCHITECTS.

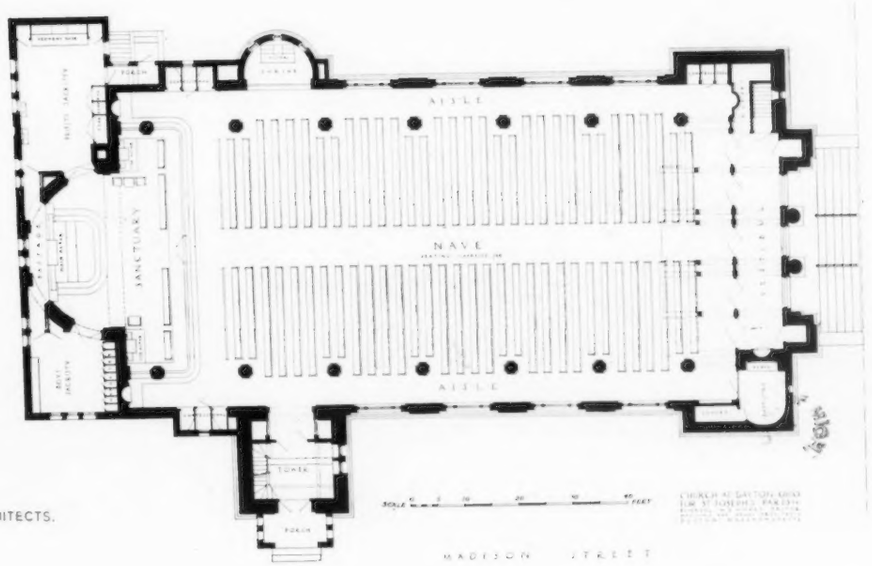

DETAILS.
YALE BOAT CLUB HOUSE,
NEW HAVEN, CONN.
PEABODY & STEARNS, ARCHITECTS.
SECTION ON CENTRE LINE
SECTION A B
SECTION C D
PLAN X X
NOTE
ONE-HALF ELEVATION OF FRONT GABLE SHOWING
MEASUREMENTS ON THIS
SHEET ARE FROM CENTRE
TO CENTRE OF JOINTS
T.C. COPING & ORNAMENT ETC AROUND WINDOW
SCALE
FEET


ONE HALF PLAN OF FRONT
CHURCH
FOR
ST. JOSEPH'S PARISH,
DAYTON, OHIO.
MAGINNIS & WALSH,
ARCHITECTS.
VERTICAL SECTION
FRONT ELEVATION



CHURCH FOR ST. JOSEPH'S PARISH, DAYTON, OHIO.
MAGINNIS & WALSH, ARCHITECTS.

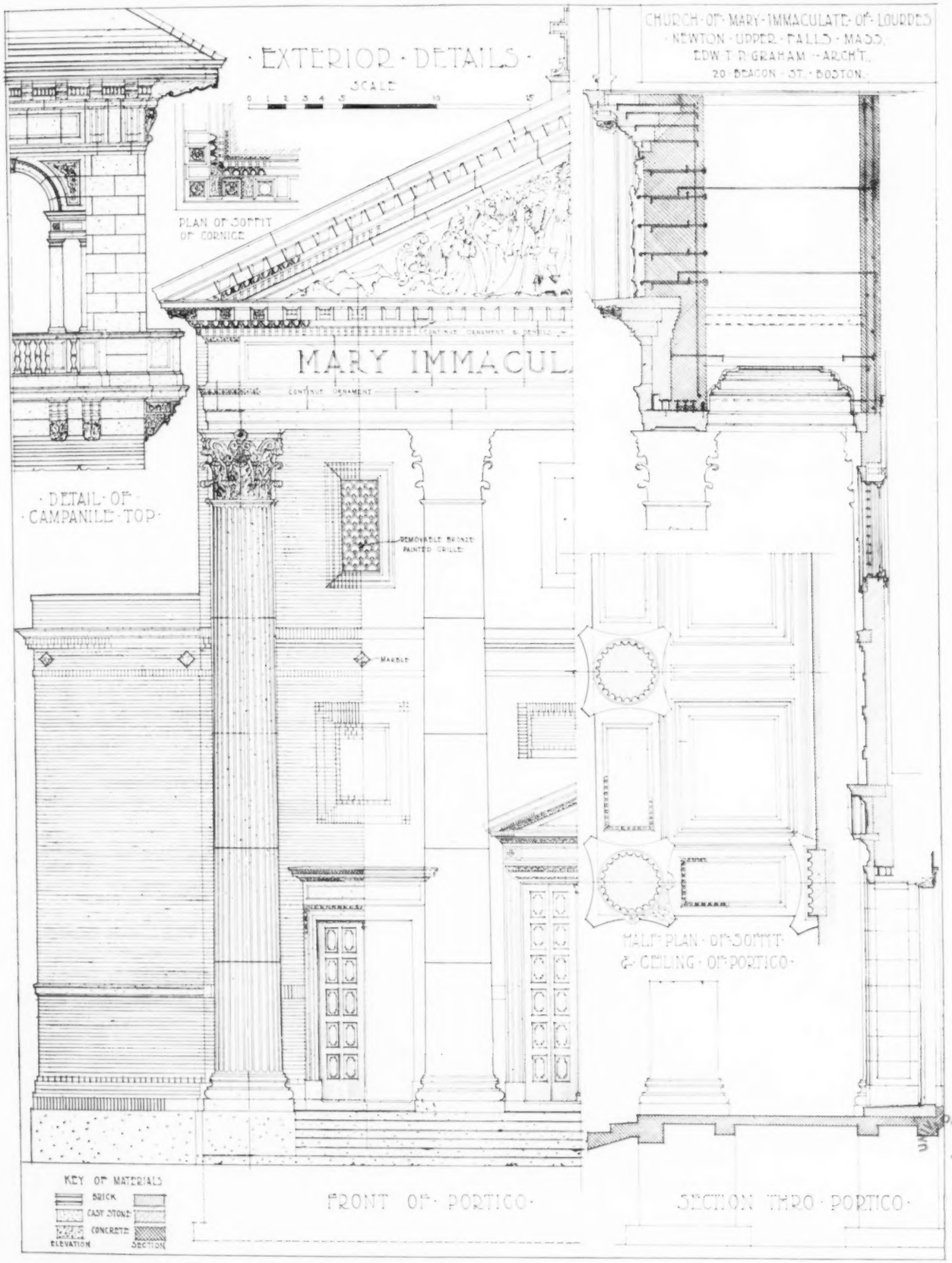
CHURCH
FOR
ST. JOSEPH'S PARISH,
DAYTON, OHIO.



MAGINNIS & WALSH, ARCHITECTS.

UNIV. OF MICH

CHURCH OF MARY IMMACULATE OF LOURDES,
NEWTON UPPER FALLS, MASS.
EDWARD T. P. GRAHAM, ARCHITECT.



CHURCH OF MARY IMMACULATE OF LOURDES, NEWTON UPPER FALLS, MASS.
EDWARD T. P. GRAHAM, ARCHITECT.

FIRST FLOOR PLAN

CHURCH OF MARY IMMACULATE OF LOURDES,
NEWTON UPPER FALLS, MASS.
EDWARD T. P. GRAHAM, ARCHITECT

HOUSE AT MINNEAPOLIS, MINN.

WILLIAM M. KENYON,
ARCHITECT.

SECOND FLOOR PLAN

ON WILKINS AVENUE.

FIRST FLOOR PLAN

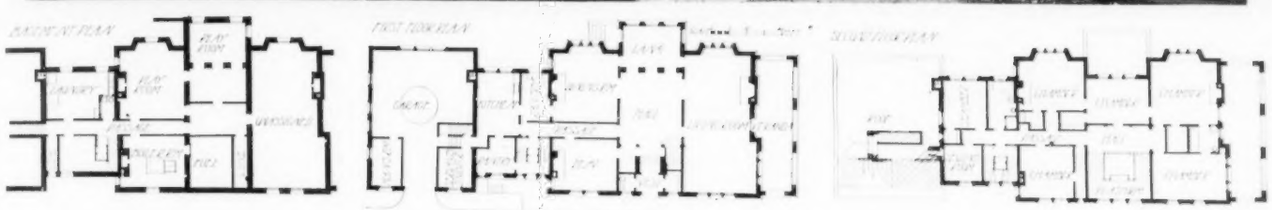
SECOND FLOOR PLAN

ON SHADY AVENUE.

FIRST FLOOR PLAN

TWO HOUSES AT PITTSBURG, PA.

MACCLURE & SPAHR, ARCHITECTS.



HOUSE AT MINNEAPOLIS, MINN.
REED & STEM, ARCHITECTS.